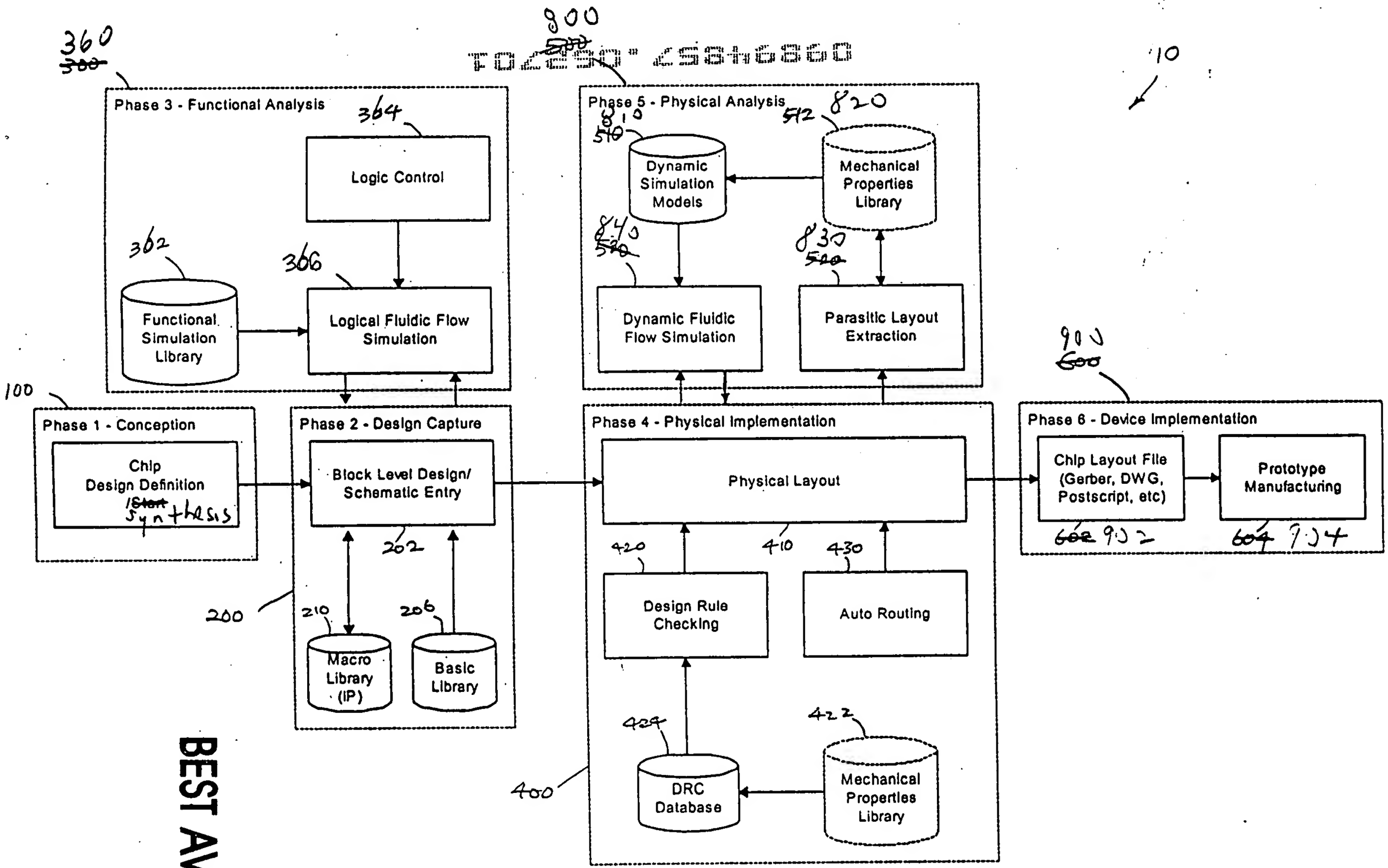


FIG. 1

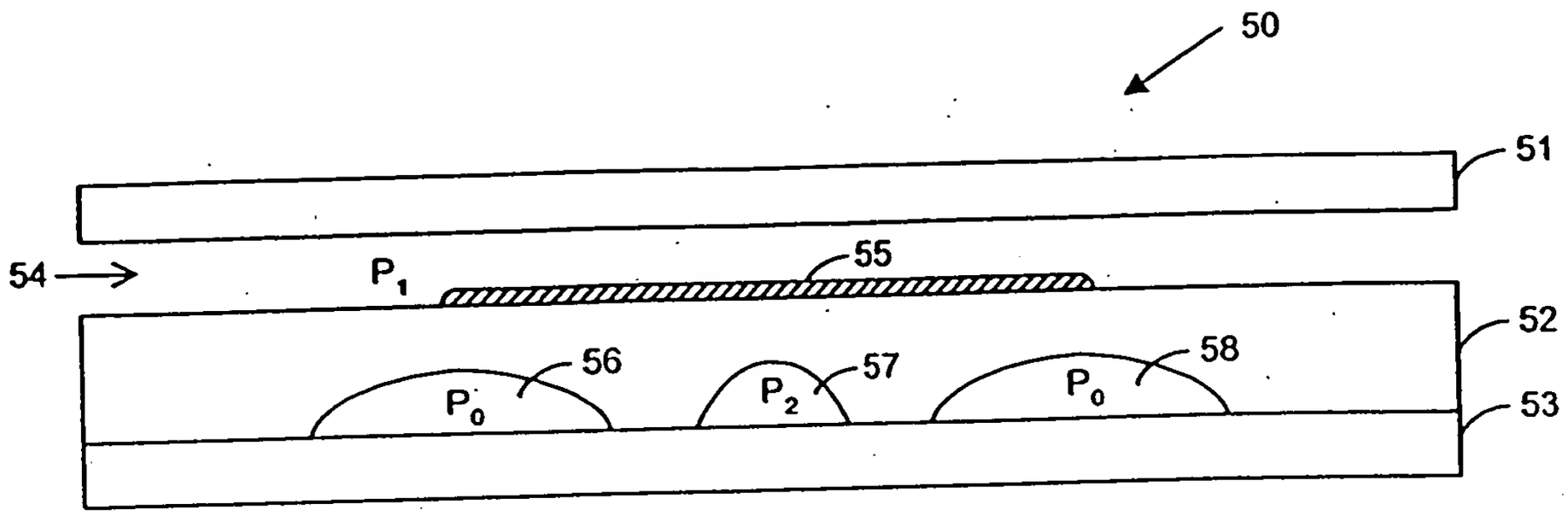


FIG. 5A 2A

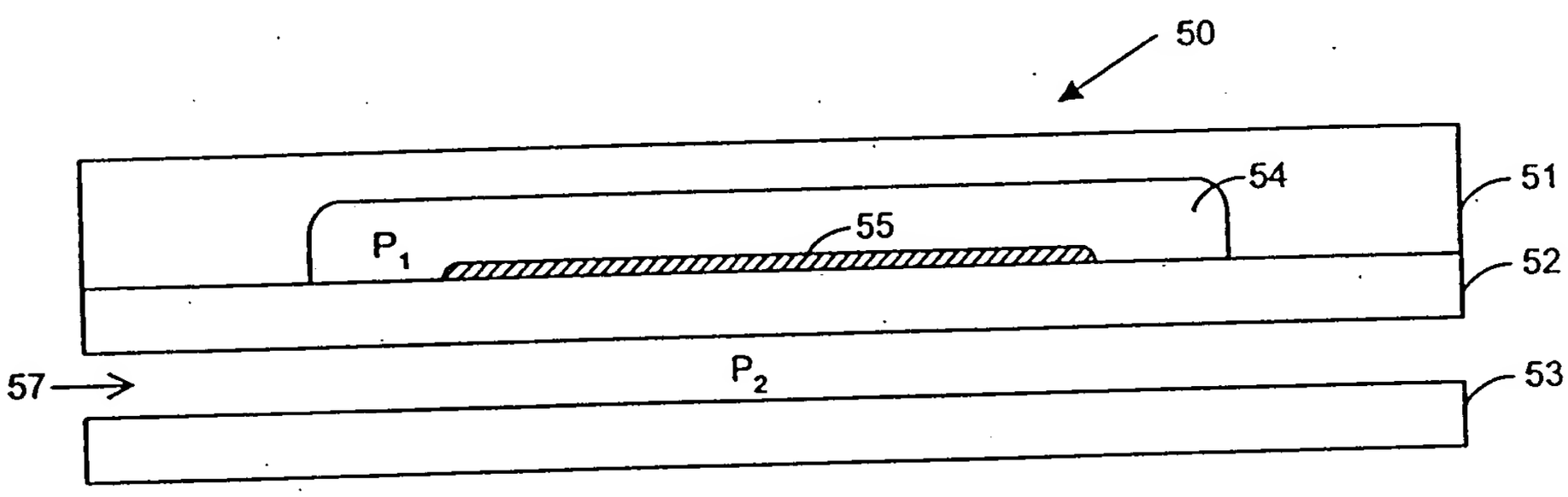


FIG. 5B 2B

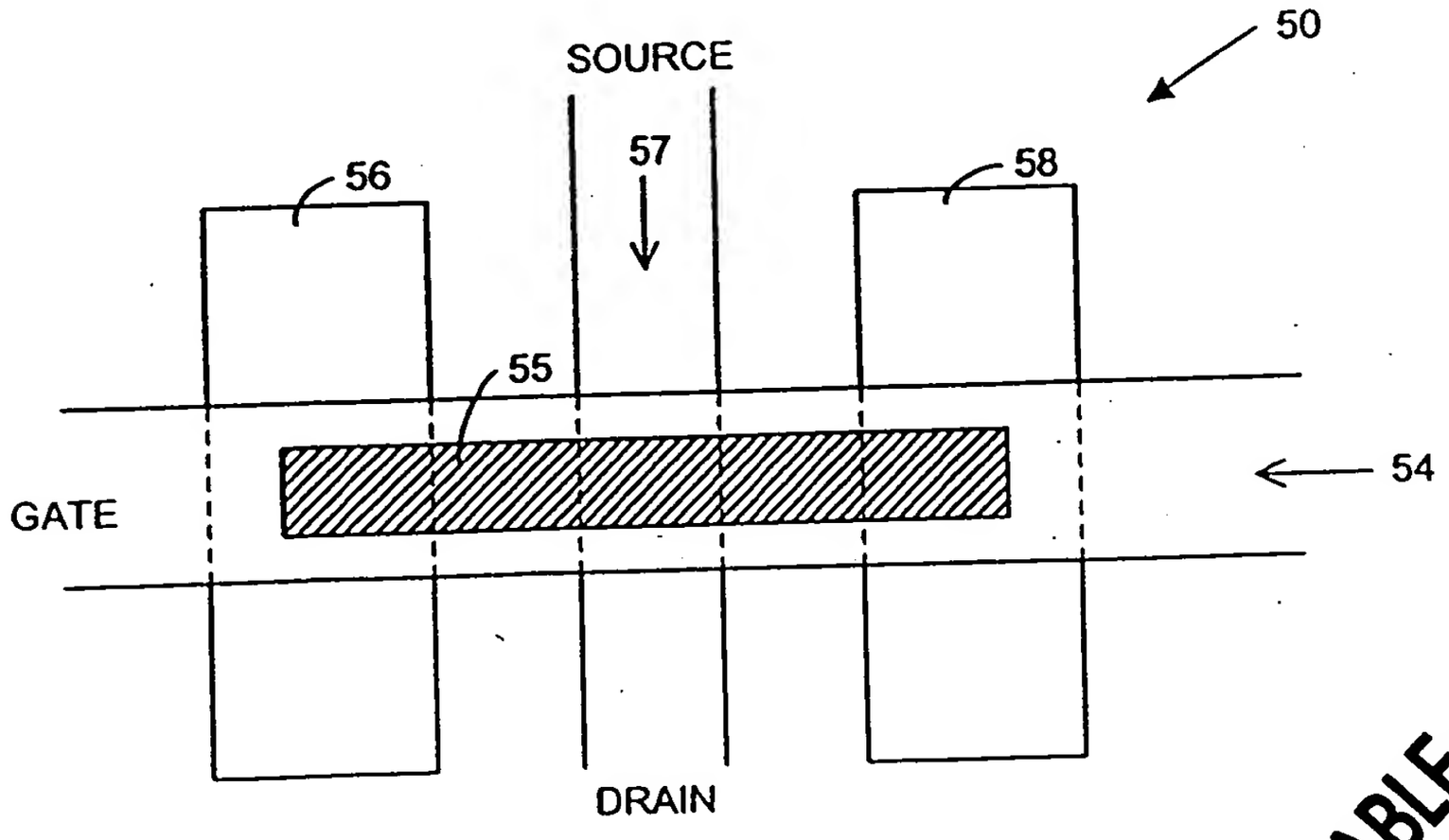


FIG. 6 3

FIG. ~~11~~ 4A

FIG. ~~11~~ 4B

FIG. ~~11~~ 4C

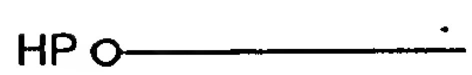


FIG. ~~11~~ 4D

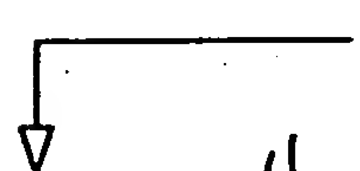


FIG. ~~11~~ 4E

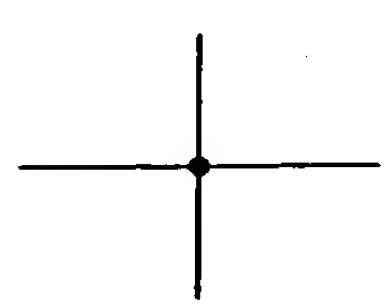


FIG. ~~11~~ 4F

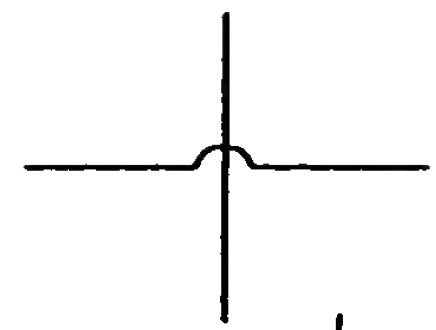


FIG. ~~11~~ 4G

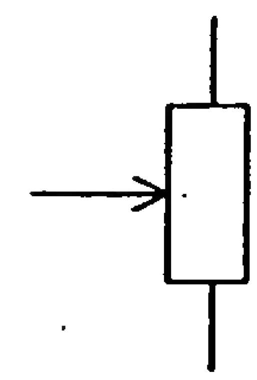


FIG. ~~11~~ 4H

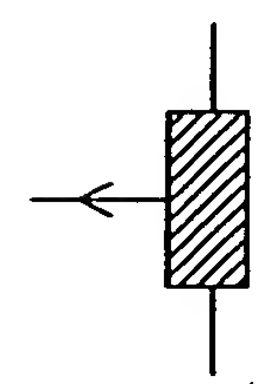


FIG. ~~11~~ 4I

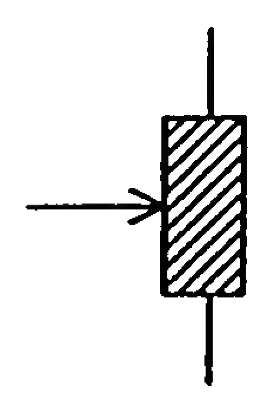


FIG. ~~11~~ 4J

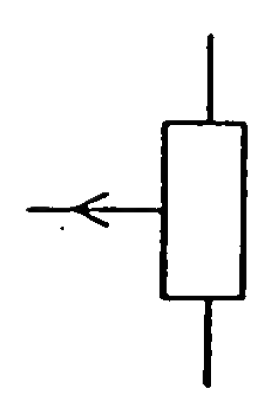


FIG. ~~11~~ 4K

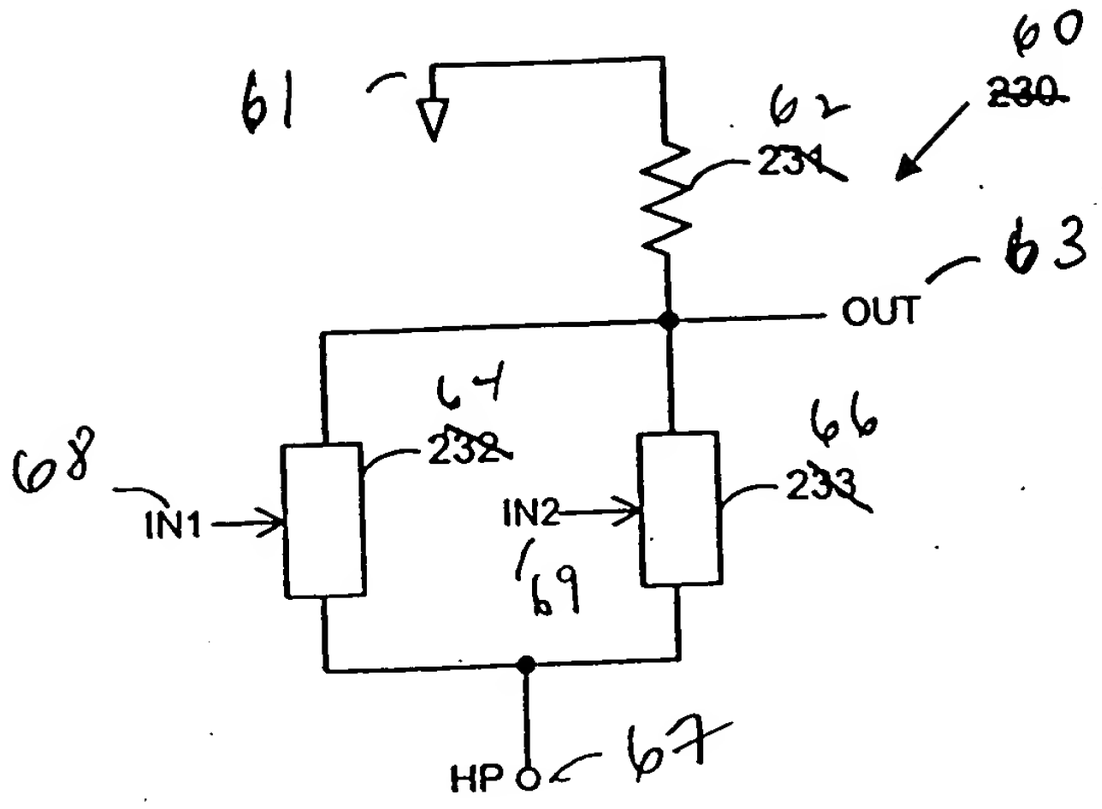


FIG. ~~12A~~ 5A

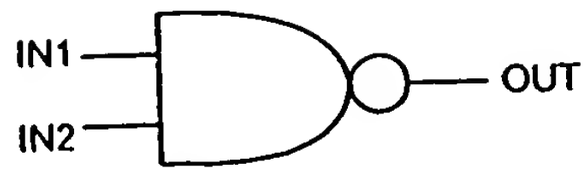
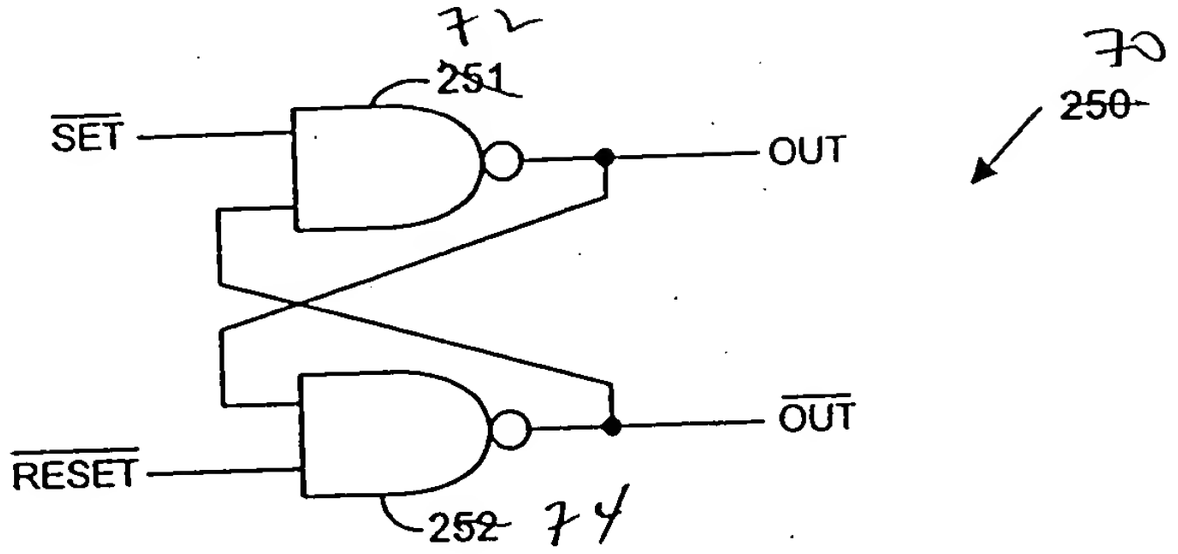


FIG. ~~12B~~ 5B



~~FIG. 13~~ Fig 6A

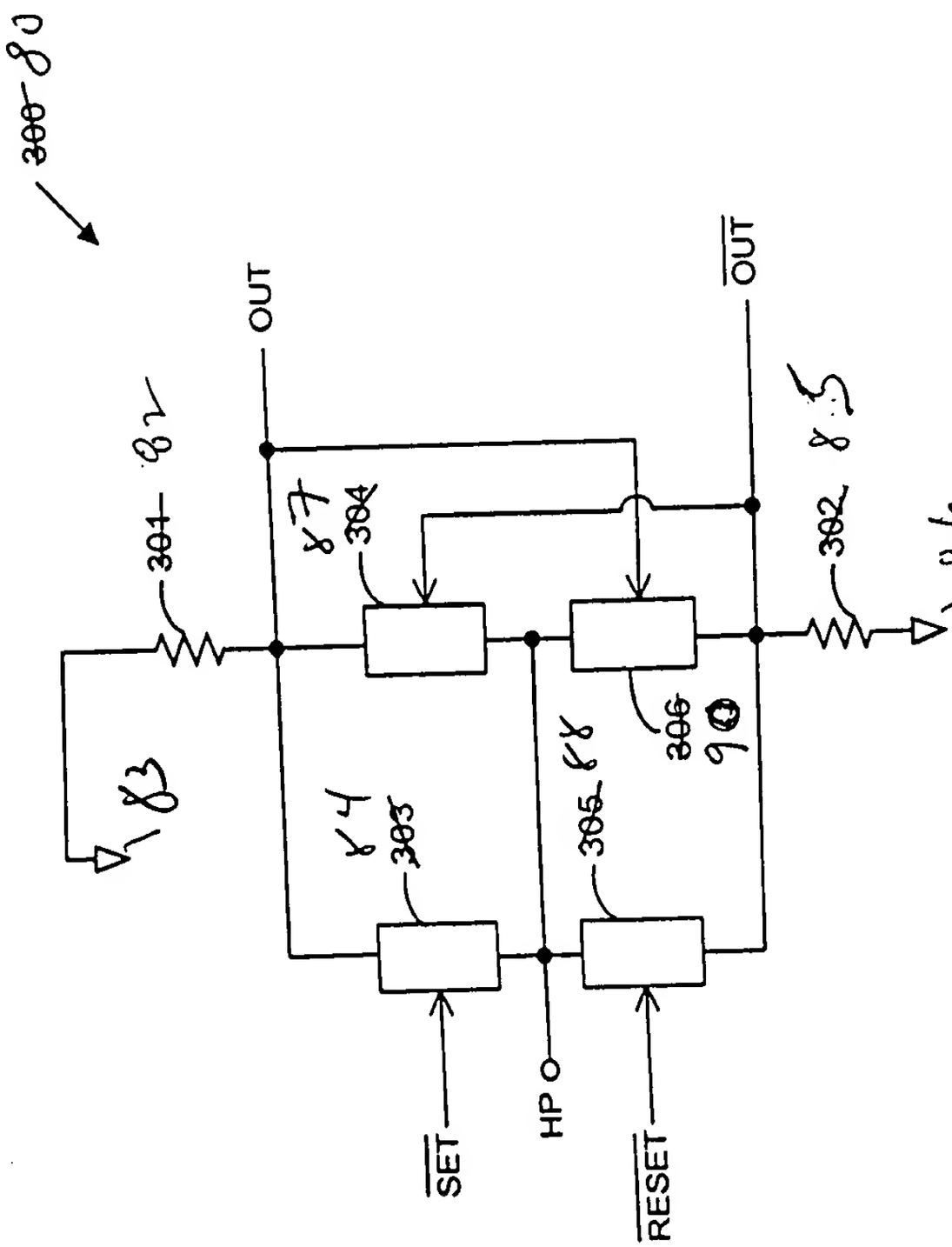


FIG. 1A Fig 1B

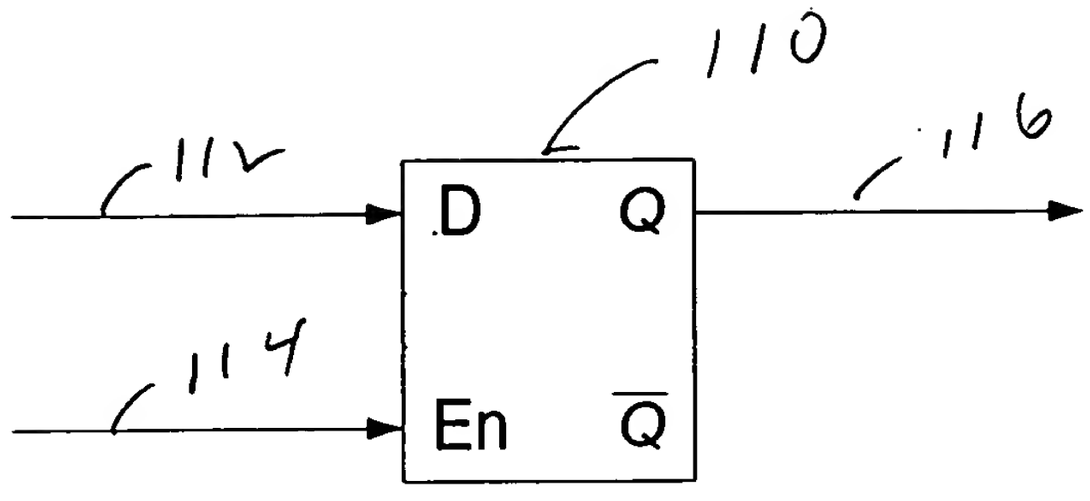


Fig 7A

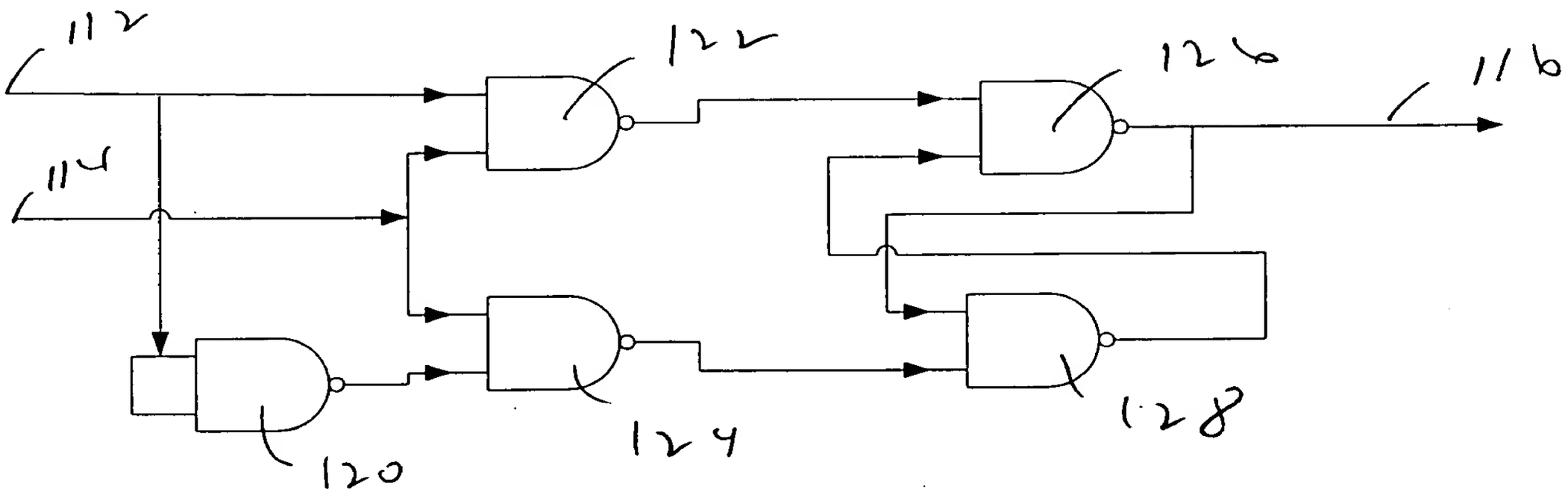


Fig 7B

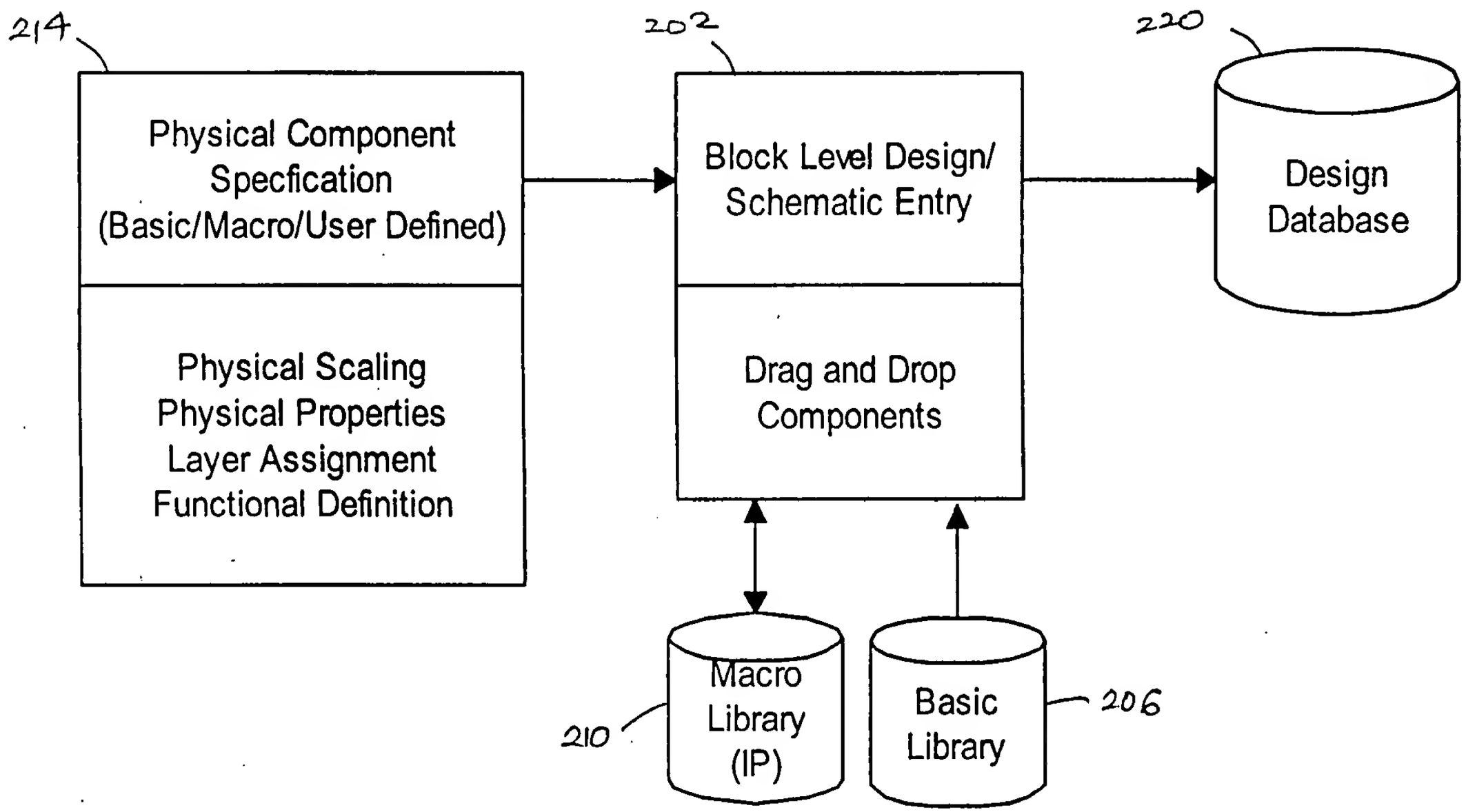

214
Physical Component Specfication (Basic/Macro/User Defined)
Physical Scaling
Physical Properties
Layer Assignment
Functional Definition
202
Block Level Design/ Schematic Entry
Drag and Drop Components
220
Design Database
Macro Library (IP)
210
Basic Library
206

FIG. 2

200

On-Off Valve

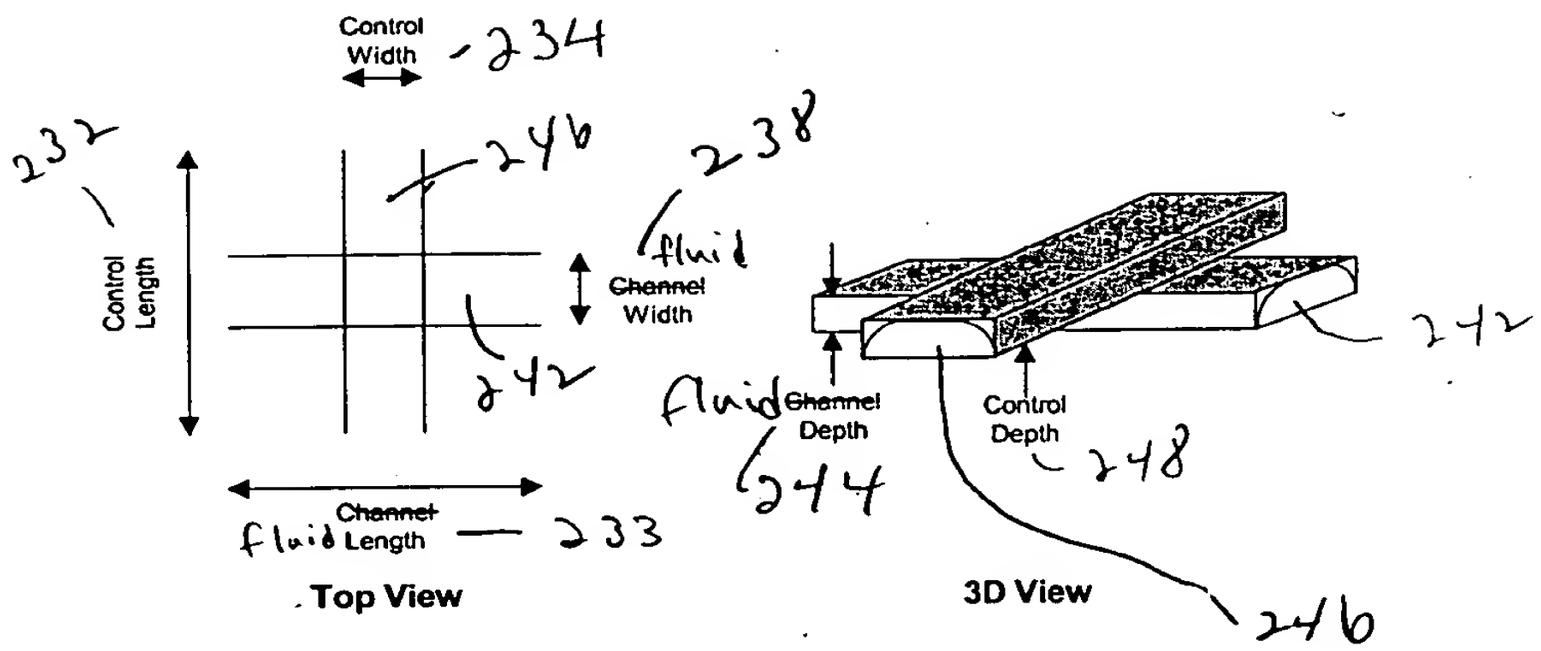


Fig 9a

Fig 9b

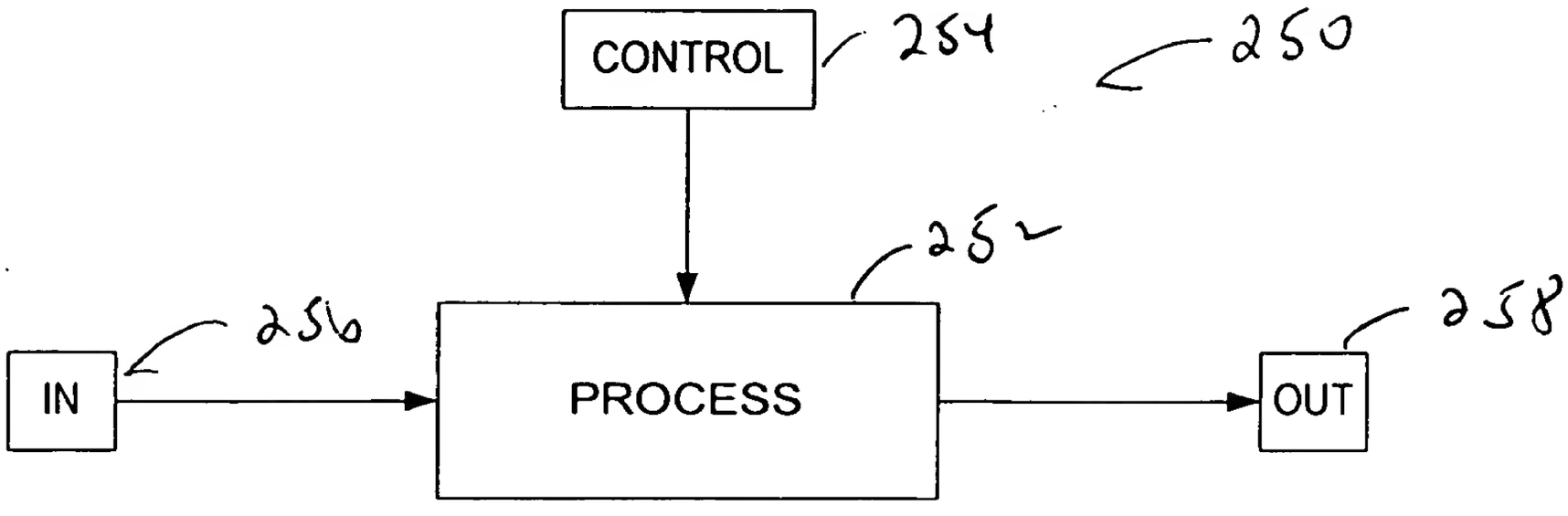

CONTROL
254
250
252
256
IN
PROCESS
258
OUT

Fig 10

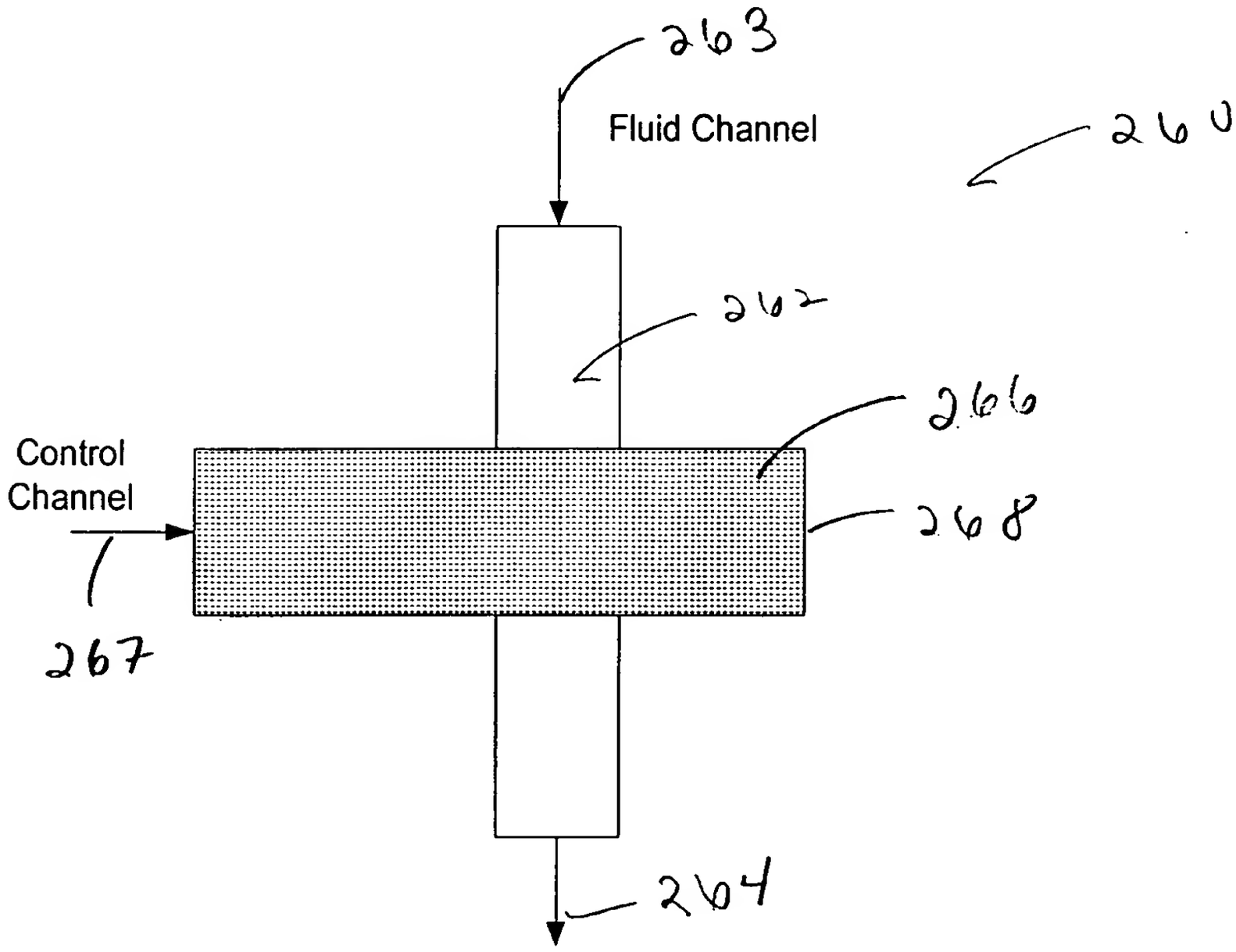

263
Fluid Channel
260
262
266
Control
Channel
268
267
264

Fig 11

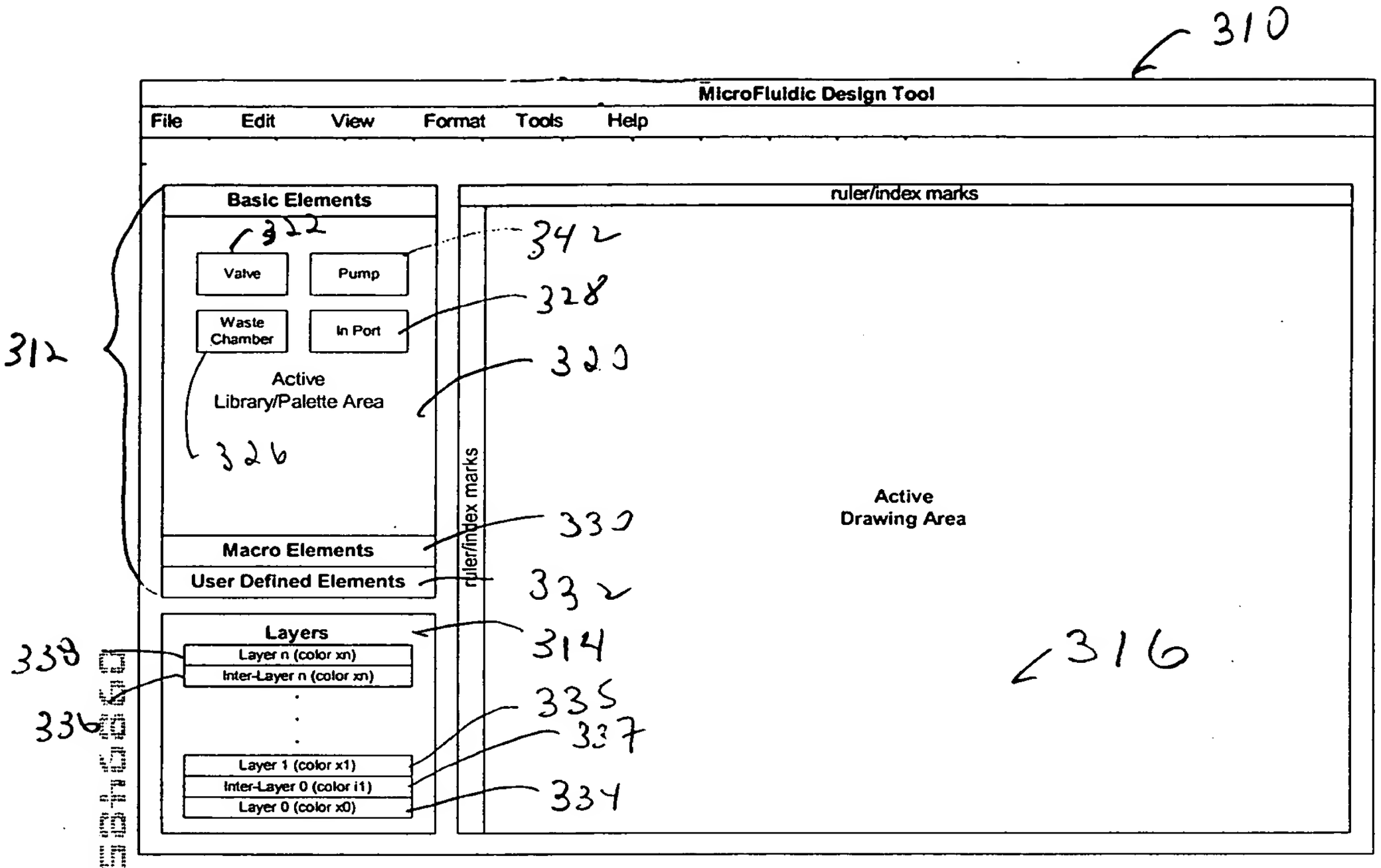

310
MicroFluidic Design Tool
File
Edit
View
Format
Tools
Help
Basic Elements
322
Valve
Pump
Waste Chamber
In Port
Active Library/Palette Area
326
312
Macro Elements
User Defined Elements
Layers
Layer n (color xn)
Inter-Layer n (color xn)
Layer 1 (color x1)
Inter-Layer 0 (color i1)
Layer 0 (color x0)
ruler/index marks
ruler/index marks
Active Drawing Area
316
342
328
320
330
332
314
335
337
334
338
336

Fig 12

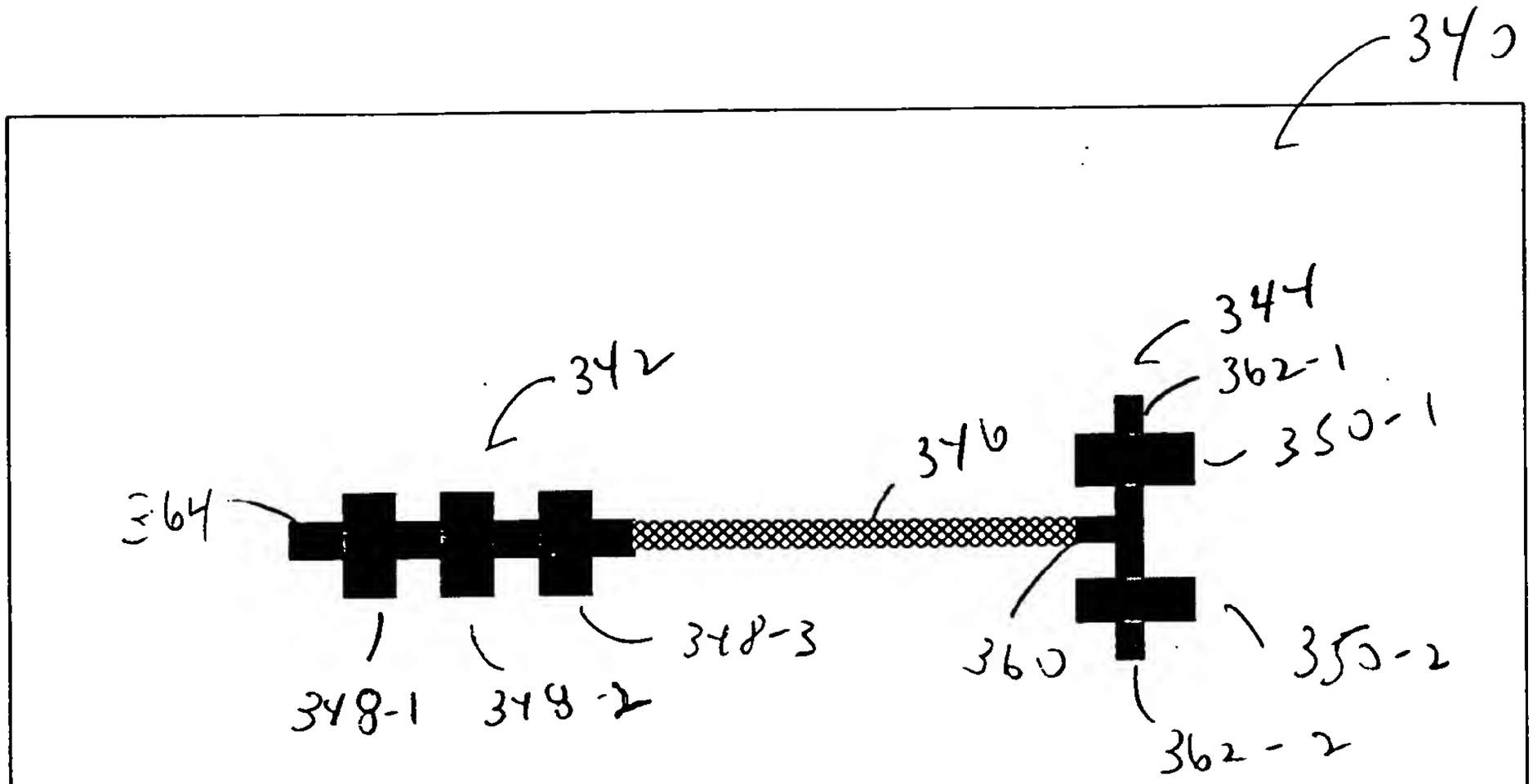


Fig 13A

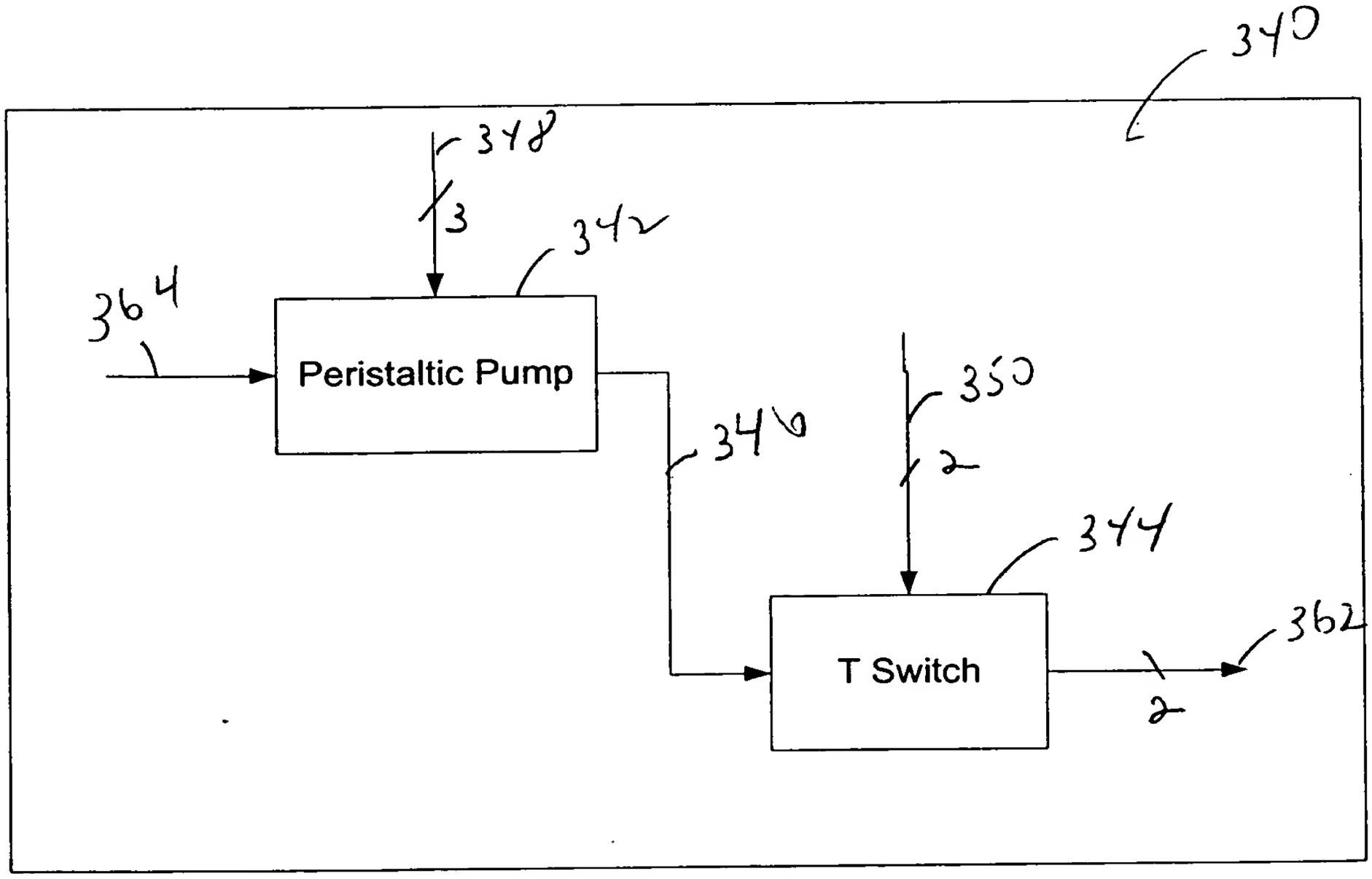


Fig 13B

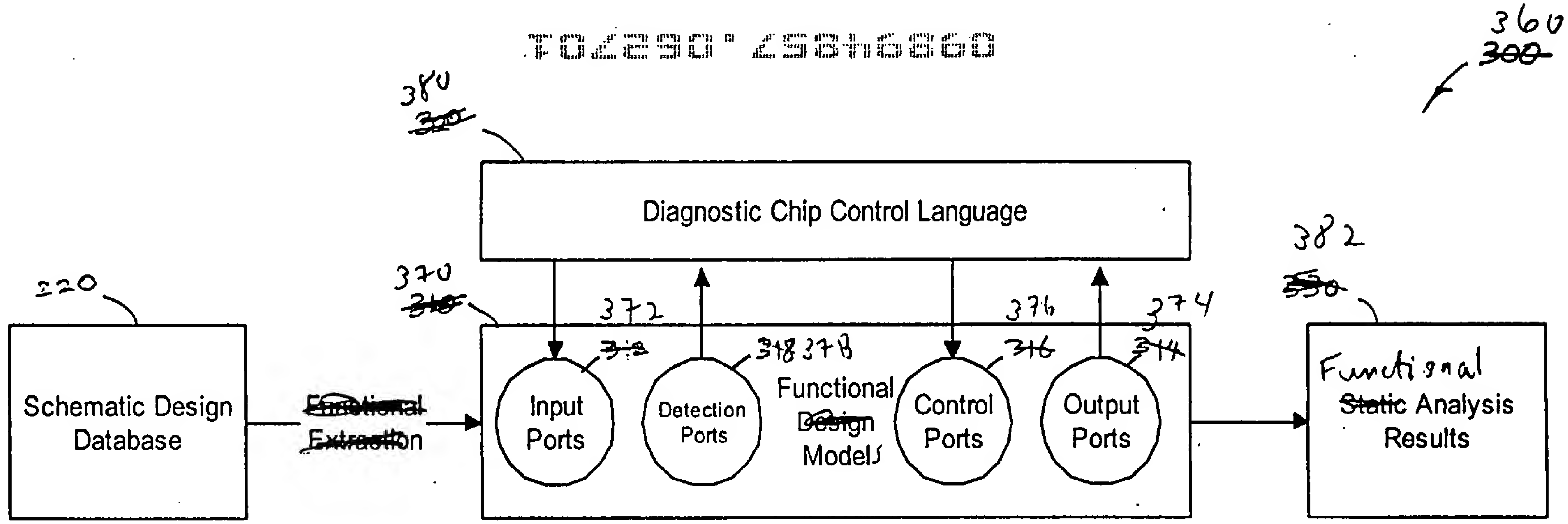

360
300
380
300
Diagnostic Chip Control Language
220
Schematic Design
Database
Functional
Extraction
370
310
372
312
Input
Ports
Detection
Ports
318 378
Functional
Design
Models
376
316
Control
Ports
374
314
Output
Ports
382
330
Functional
Static Analysis
Results

FIG. 14

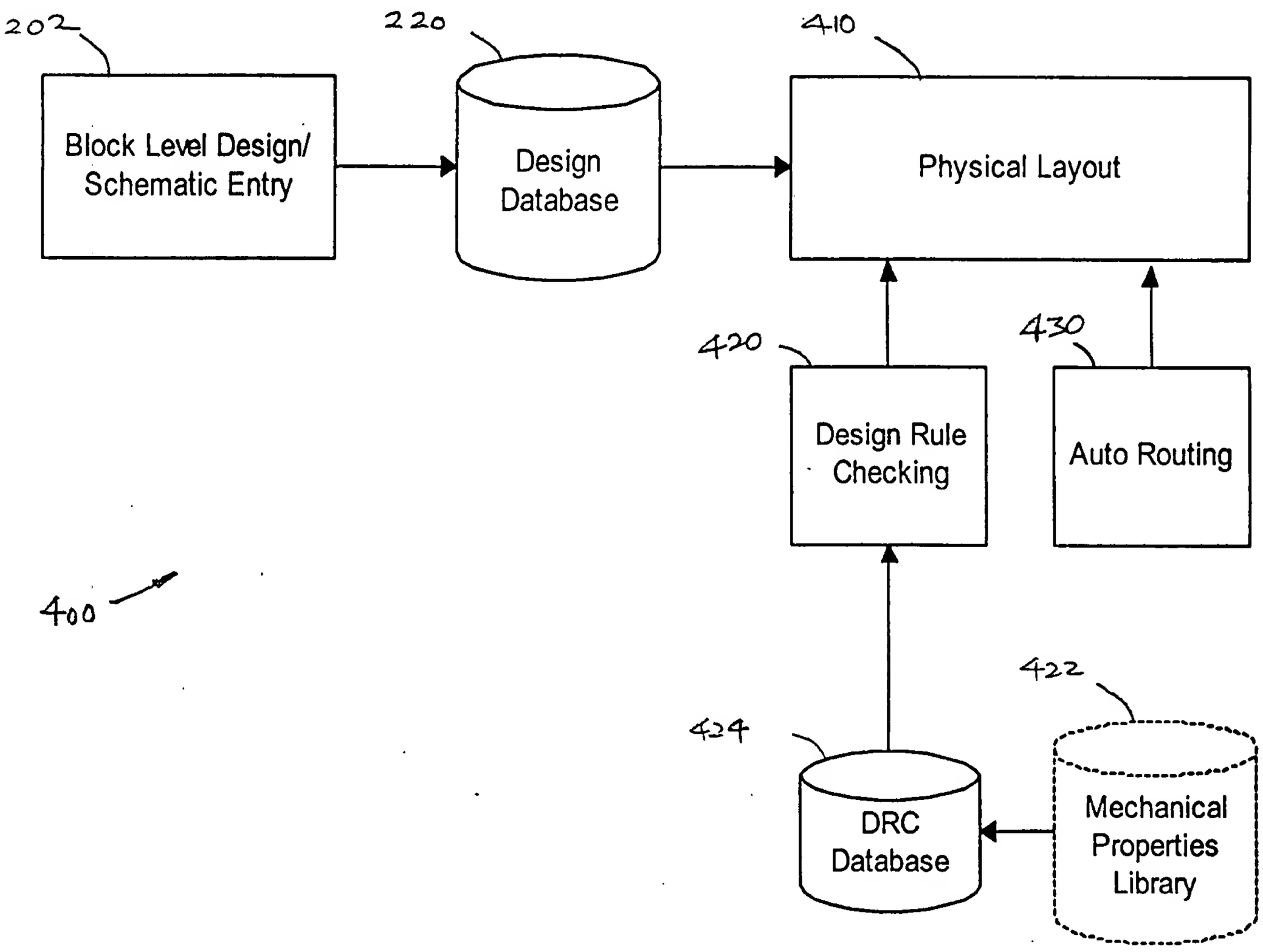

202
Block Level Design/
Schematic Entry
220
Design
Database
410
Physical Layout
420
Design Rule
Checking
430
Auto Routing
400
422
424
DRC
Database
Mechanical
Properties
Library

FIG. 4

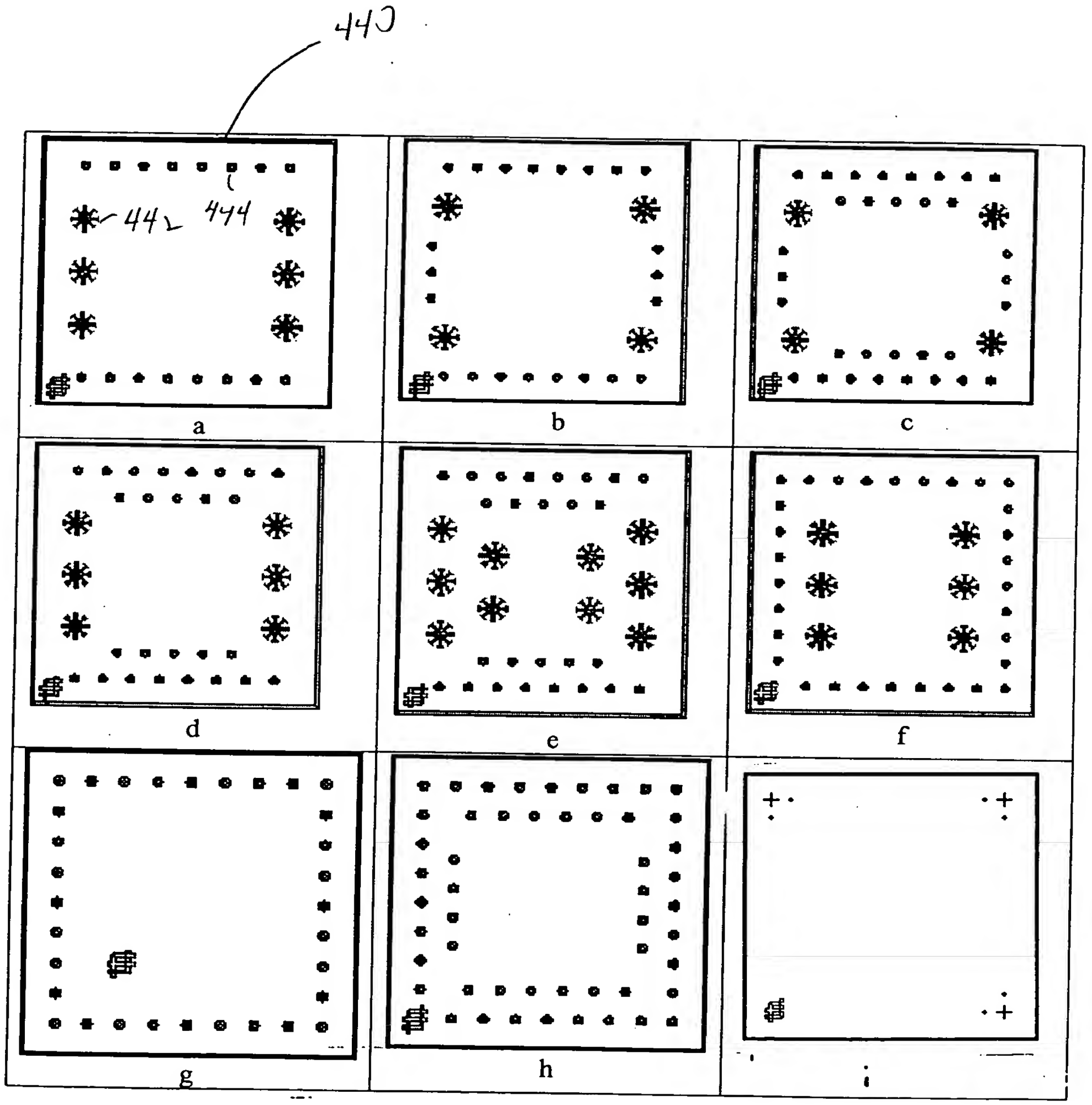


Fig 16A

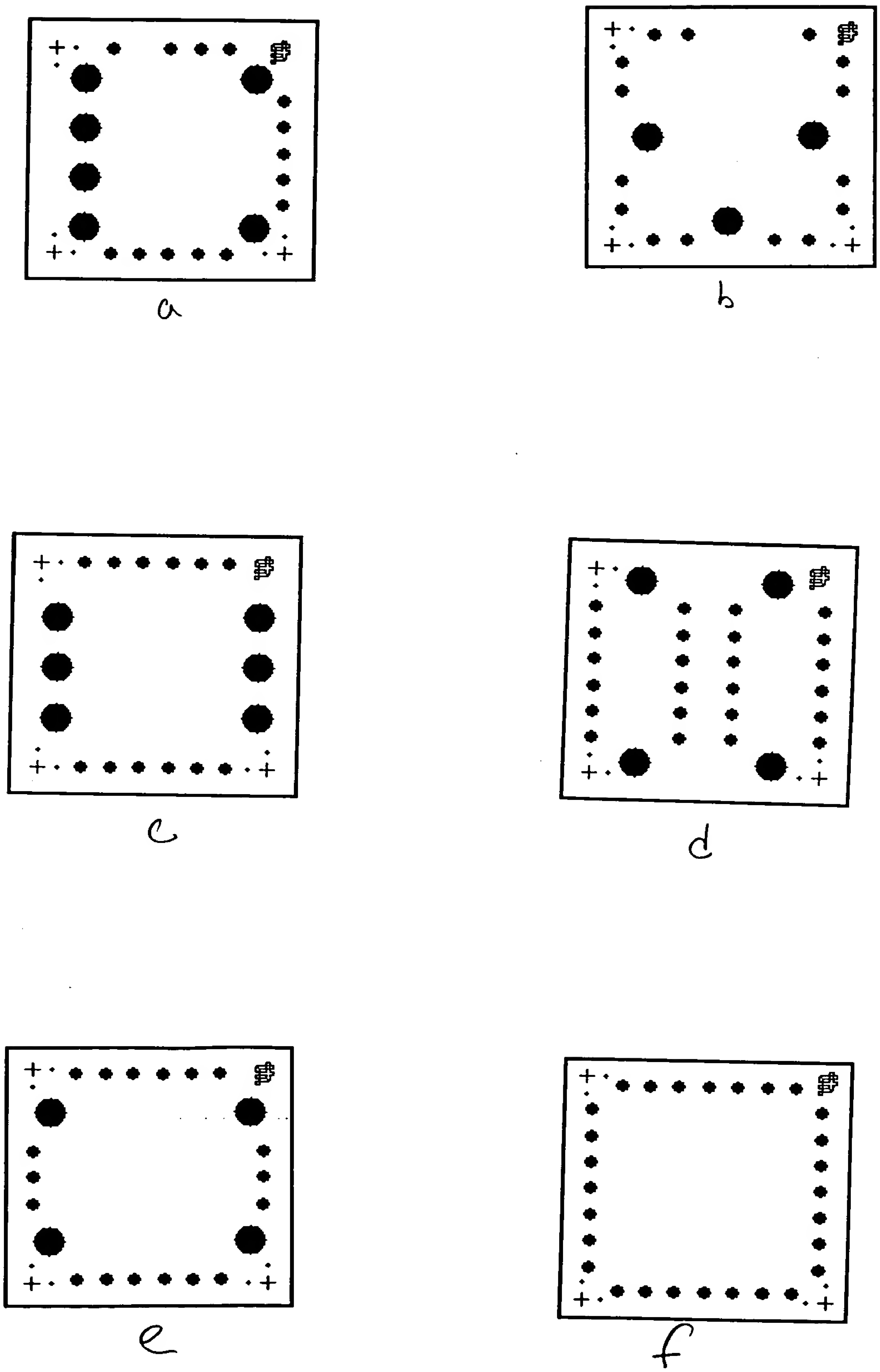


FIG. 16B

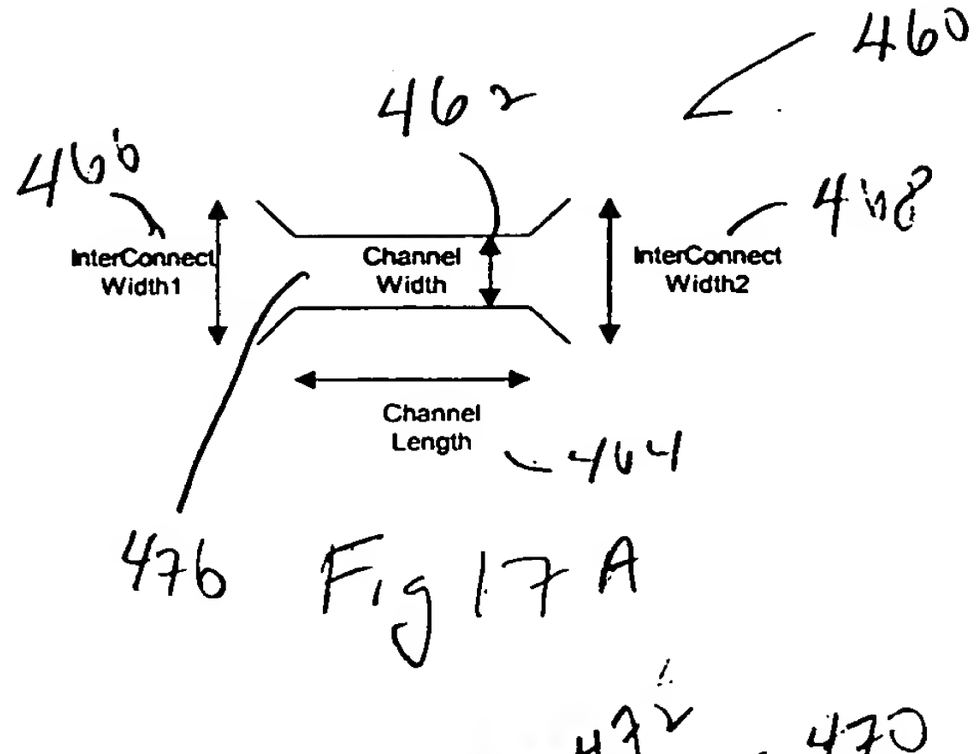


Fig 17A

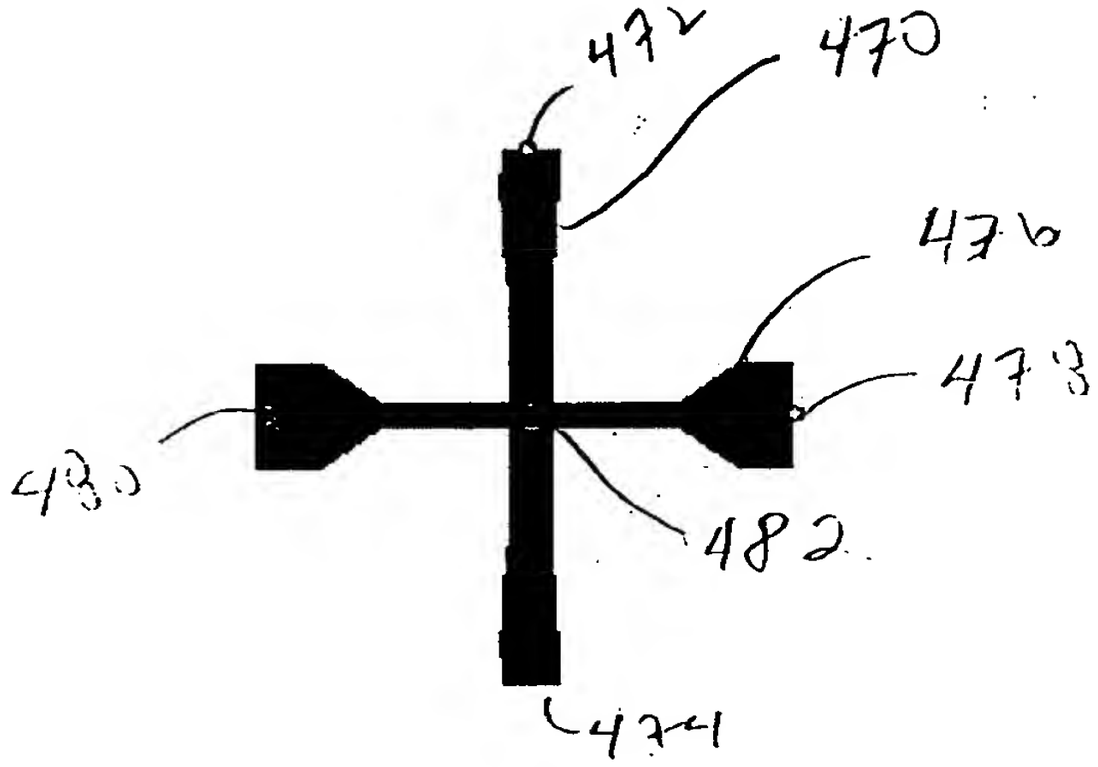


Fig 17B

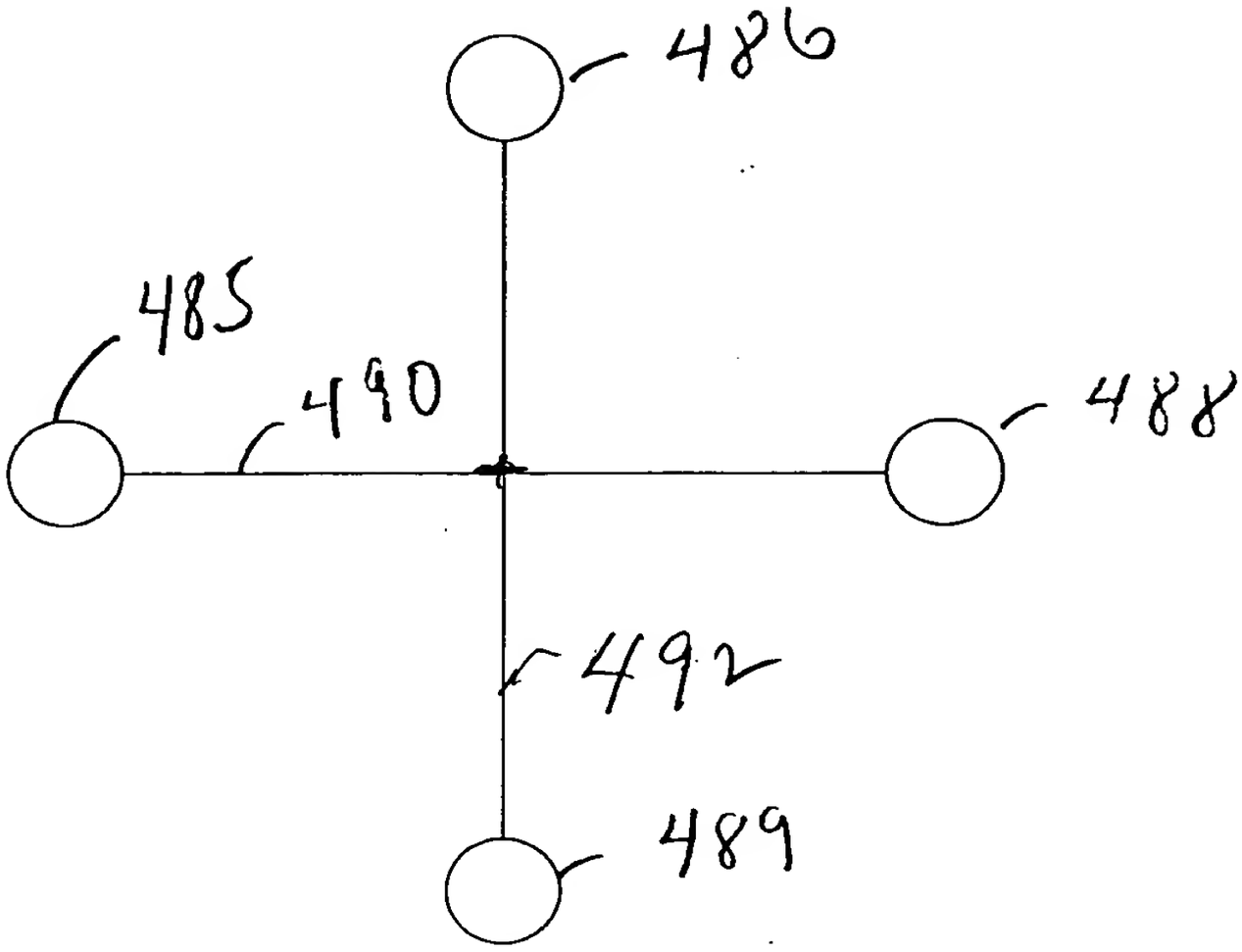


Fig 18A

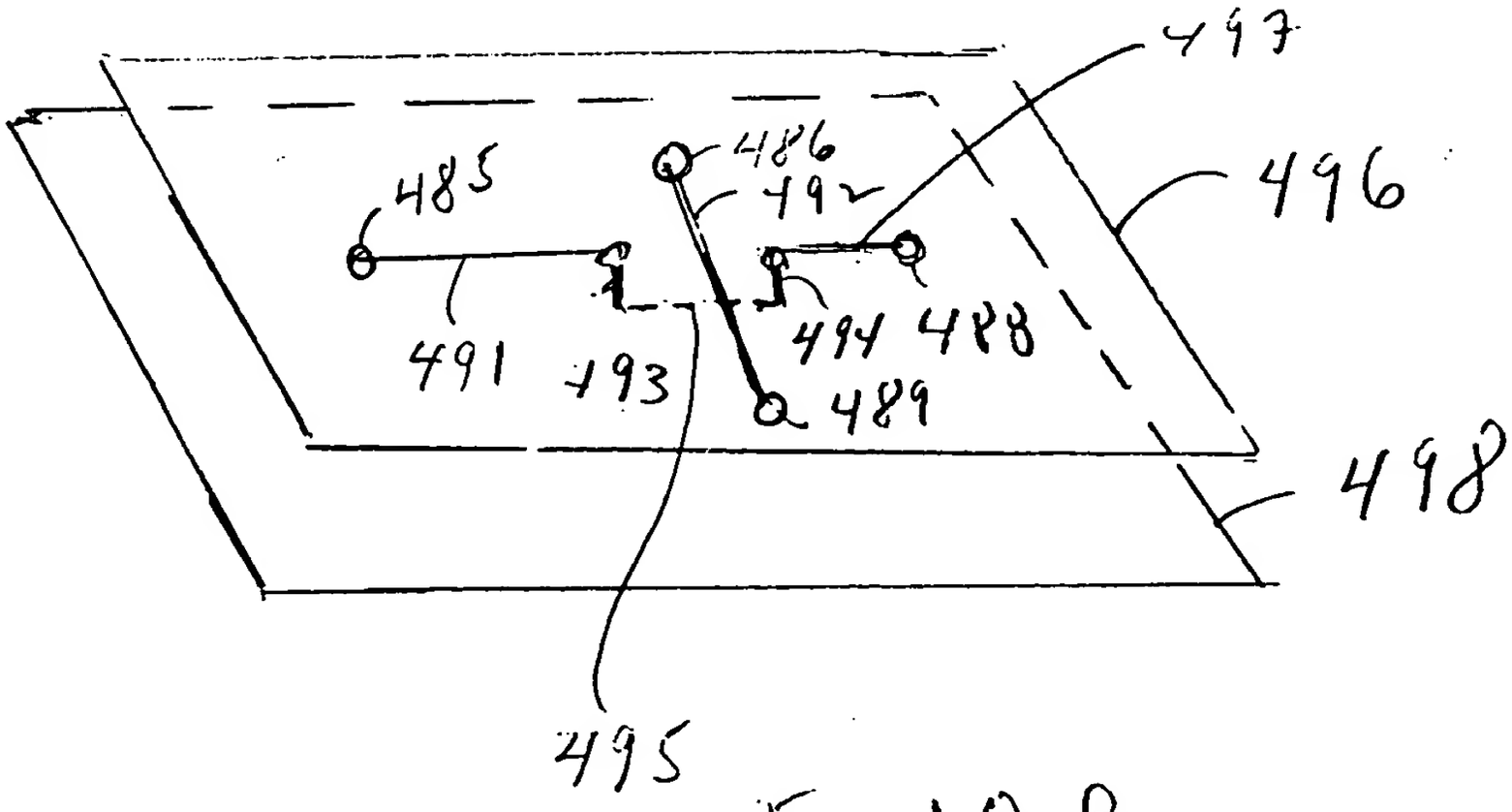


Fig 18B

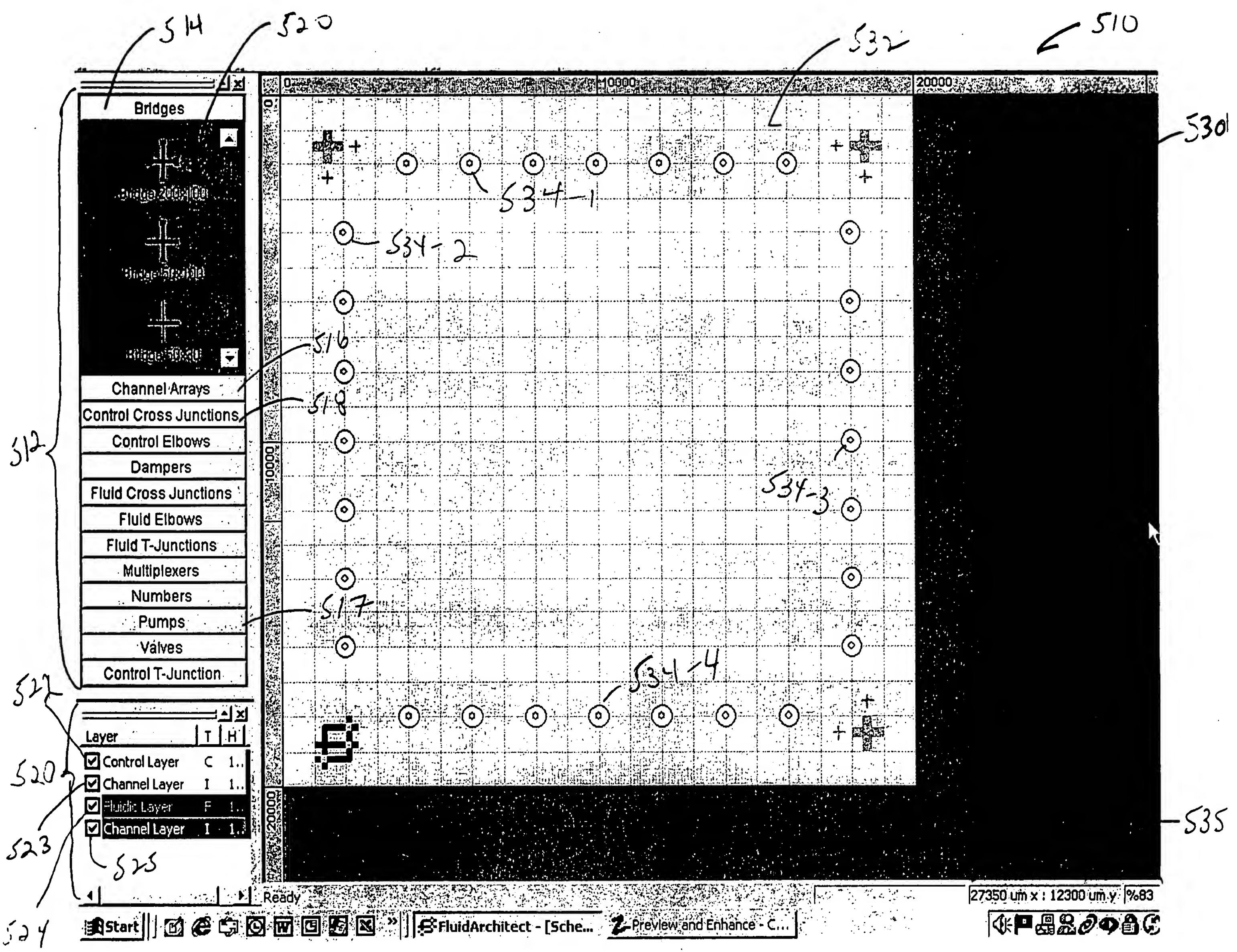

514
520
532
510
530
534-1
534-2
534-3
534-4
516
518
517
512
522
520
523
524
525
535
Bridges
Channel Arrays
Control Cross Junctions
Control Elbows
Dampers
Fluid Cross Junctions
Fluid Elbows
Fluid T-Junctions
Multiplexers
Numbers
Pumps
Valves
Control T-Junction
Layer
T
H
Control Layer
C
Channel Layer
I
Fluidic Layer
F
Channel Layer
I
0
10000
20000
Ready
27350 um x : 12300 um y
%83
Start
FluidArchitect - [Sche...
Preview and Enhance - C...

Fig. 19

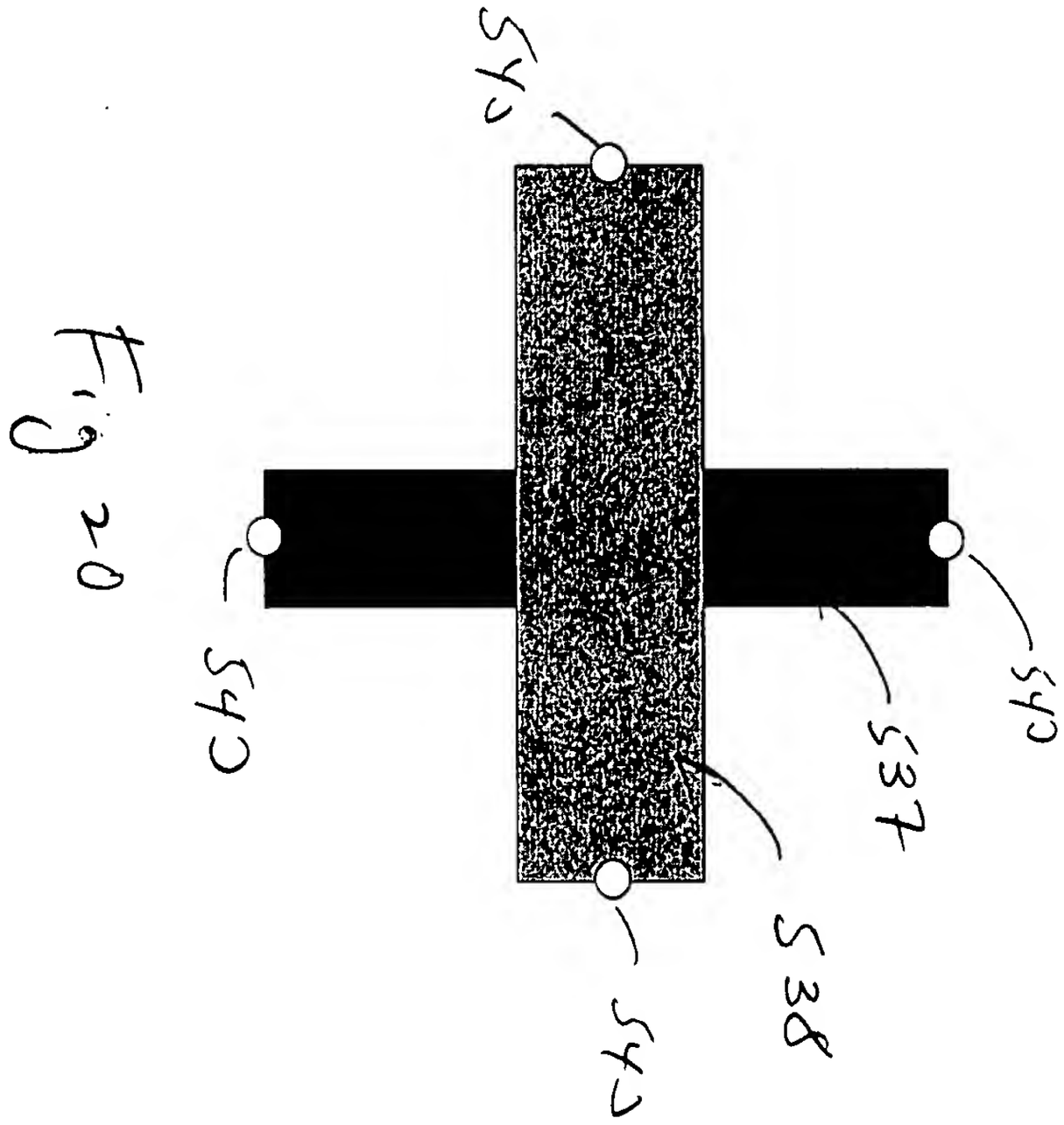


FIG 20
545
537
540
538
543

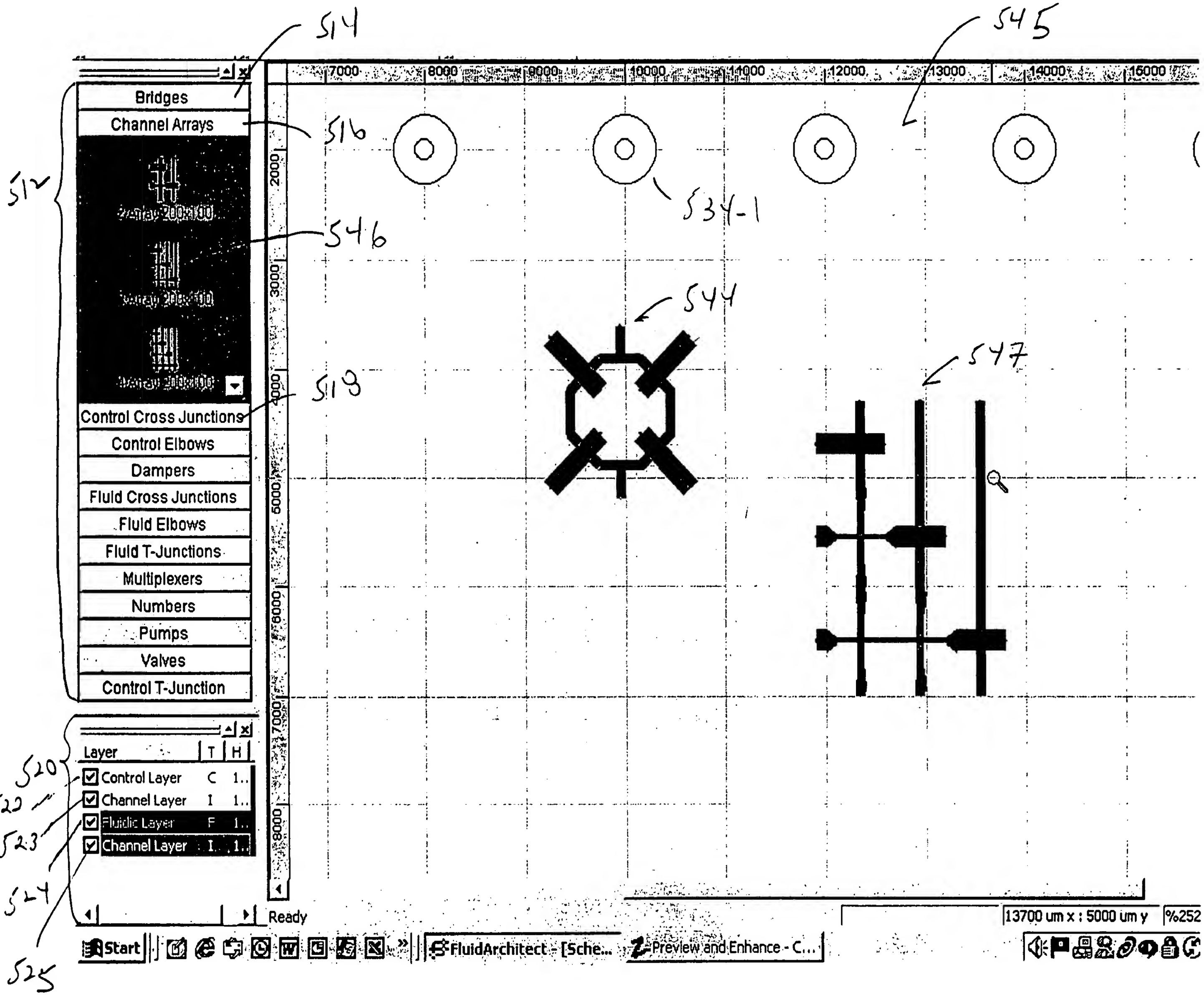

514
545
516
534-1
546
544
519
547
Bridges
Channel Arrays
Control Cross Junctions
Control Elbows
Dampers
Fluid Cross Junctions
Fluid Elbows
Fluid T-Junctions
Multiplexers
Numbers
Pumps
Valves
Control T-Junction
512
520
523
524
525
Layer
T
H
Control Layer
Channel Layer
Fluidic Layer
Channel Layer
Ready
13700 um x : 5000 um y
%252
Start
FluidArchitect - [Sche...
Preview and Enhance - C...

Fig 21

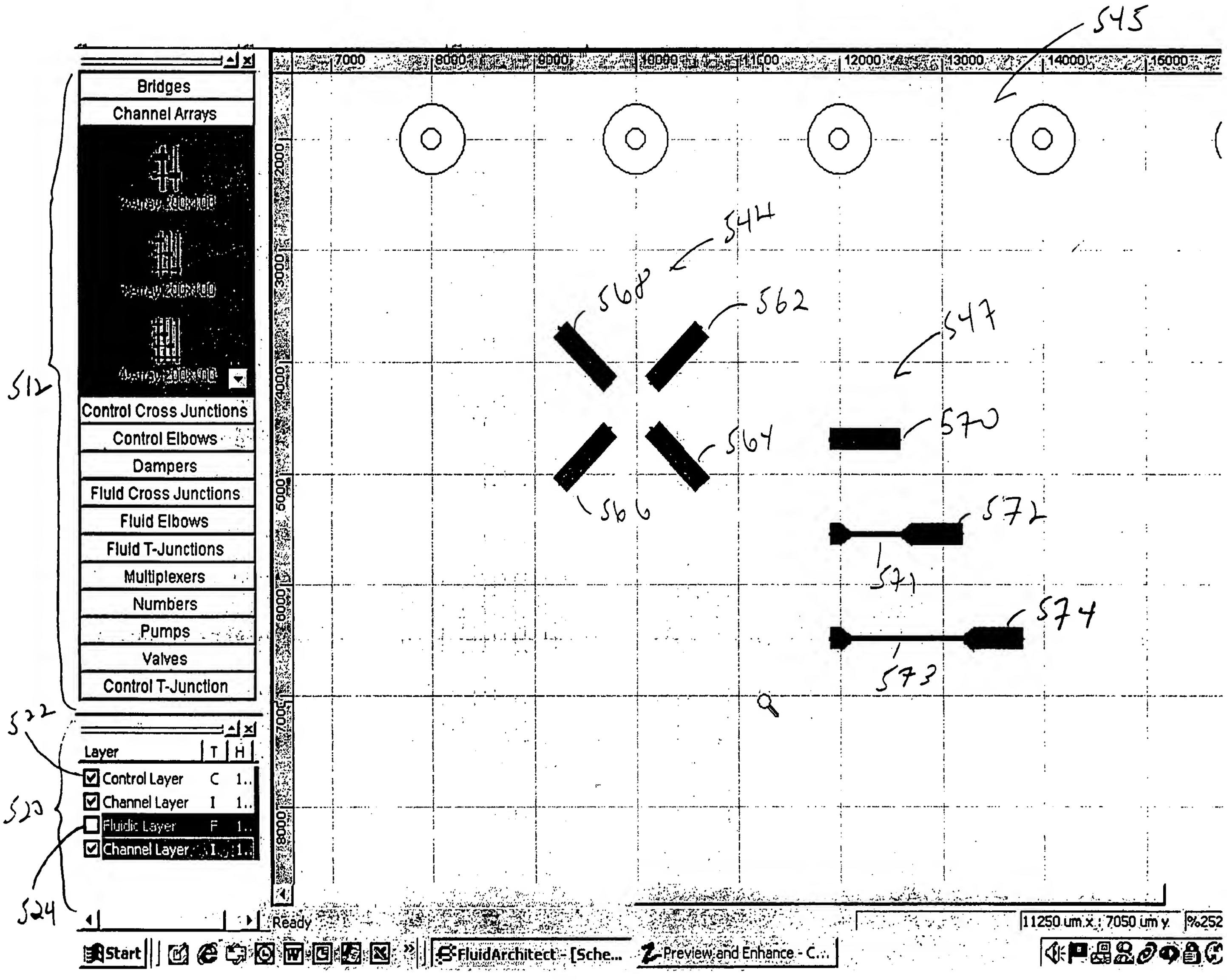

Bridges
Channel Arrays
Control Cross Junctions
Control Elbows
Dampers
Fluid Cross Junctions
Fluid Elbows
Fluid T-Junctions
Multiplexers
Numbers
Pumps
Valves
Control T-Junction
Layer T H
Control Layer C 1..
Channel Layer I 1..
Fluidic Layer F 1..
Channel Layer I 1..
7000
8000
9000
10000
11000
12000
13000
14000
15000
2000
3000
4000
5000
6000
7000
8000
Ready
11250 um x, 7050 um y
%252
Start
FluidArchitect - [Sche...
Preview and Enhance - C...
545
544
568
562
547
564
570
566
572
571
574
573
512
522
520
524

Fig 22

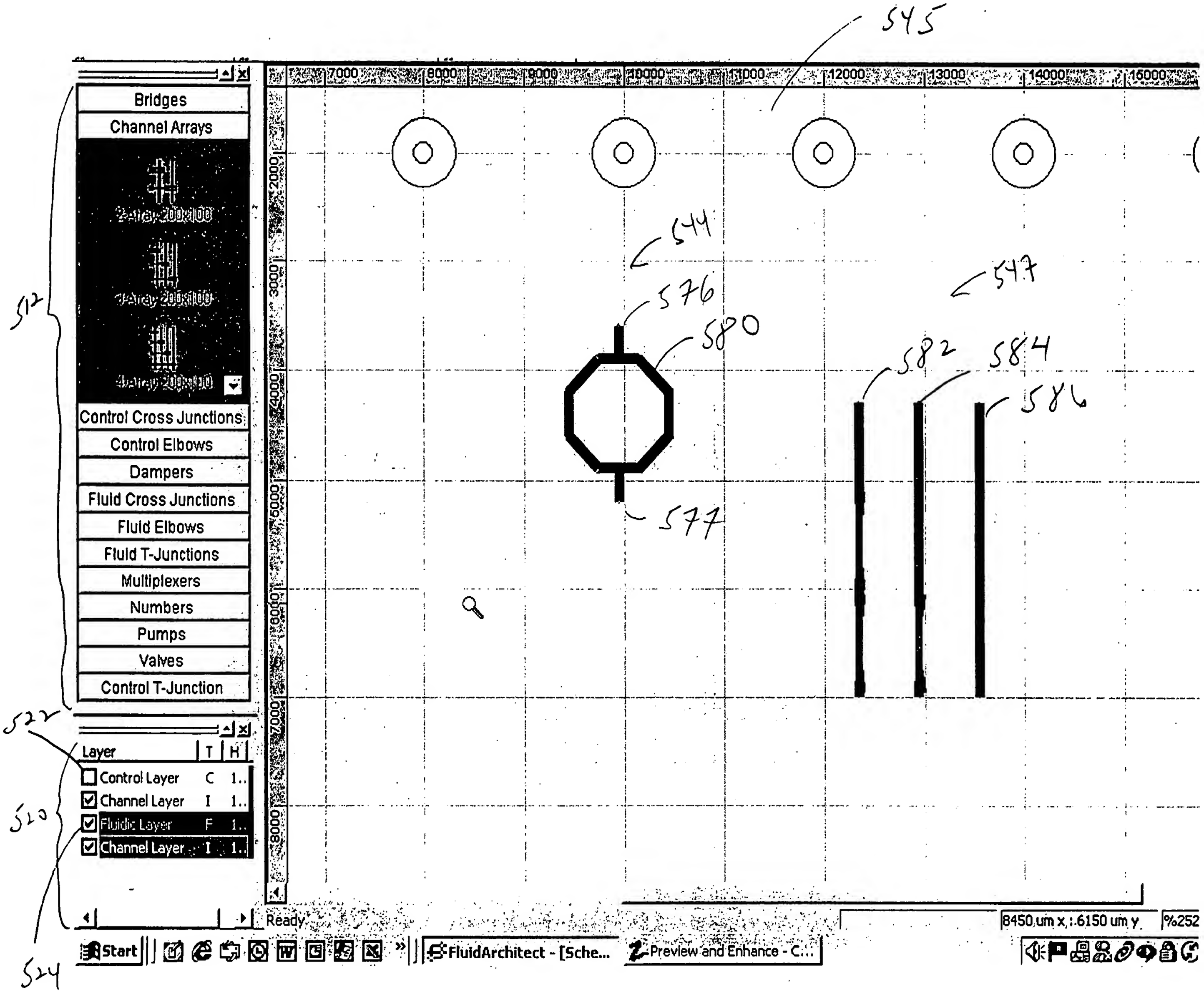

545
544
547
576
580
582
584
586
577
512
Bridges
Channel Arrays
2-array 200x100
4-array 200x100
4-array 200x100
Control Cross Junctions
Control Elbows
Dampers
Fluid Cross Junctions
Fluid Elbows
Fluid T-Junctions
Multiplexers
Numbers
Pumps
Valves
Control T-Junction
522
Layer
T
H
Control Layer C 1..
Channel Layer I 1..
Fluidic Layer F 1..
Channel Layer I 1..
520
524
7000
8000
9000
10000
11000
12000
13000
14000
15000
2000
3000
4000
5000
6000
7000
8000
Ready
8450 um x, 6150 um y
%252
Start
FluidArchitect - [Sche...
Preview and Enhance - C...

Fig 23

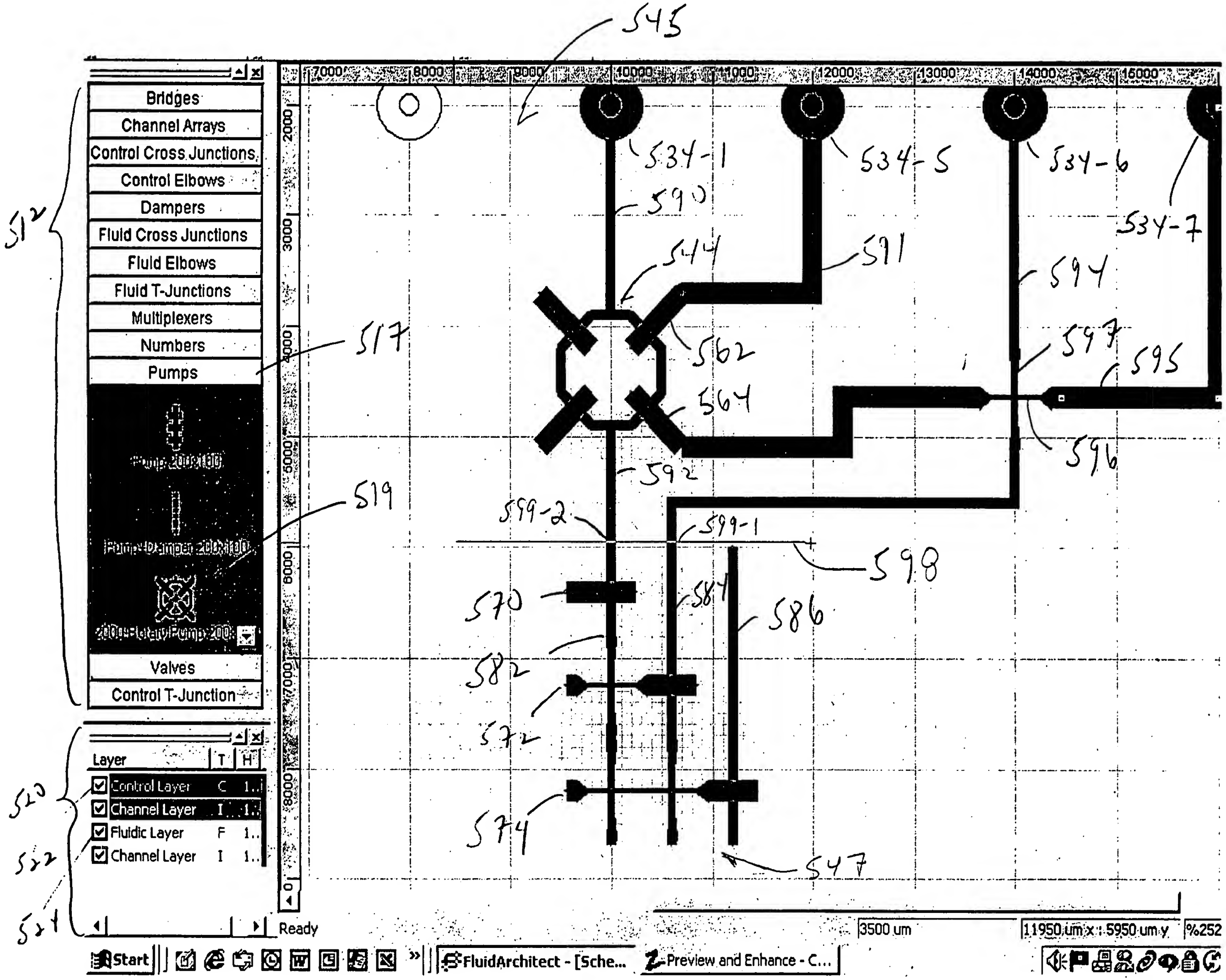

545
Bridges
Channel Arrays
Control Cross Junctions
Control Elbows
Dampers
Fluid Cross Junctions
Fluid Elbows
Fluid T-Junctions
Multiplexers
Numbers
Pumps
Valves
Control T-Junction
512
517
519
Layer
T
H
Control Layer C 1..
Channel Layer I 1..
Fluidic Layer F 1..
Channel Layer I 1..
520
522
524
534-1
534-5
534-6
534-7
590
591
594
595
596
597
598
599-1
599-2
592
564
562
544
570
582
572
574
584
586
547
7000
8000
9000
10000
11000
12000
13000
14000
15000
Ready
3500 um
11950 um x : 5950 um y
%252
Start
FluidArchitect - [Sche...
Preview and Enhance - C...

Fig 24

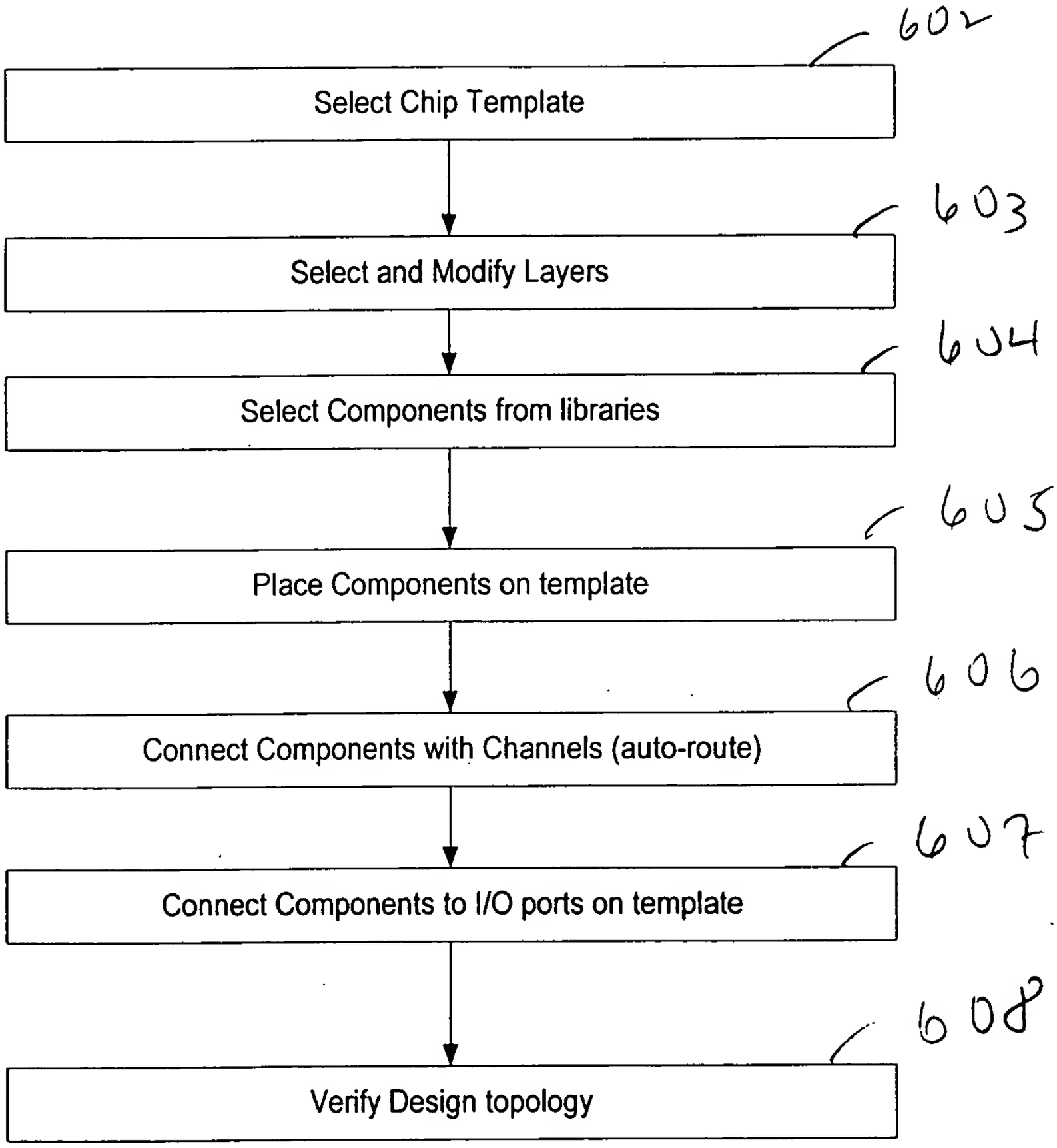

602
Select Chip Template
603
Select and Modify Layers
604
Select Components from libraries
605
Place Components on template
606
Connect Components with Channels (auto-route)
607
Connect Components to I/O ports on template
608
Verify Design topology

Fig 25

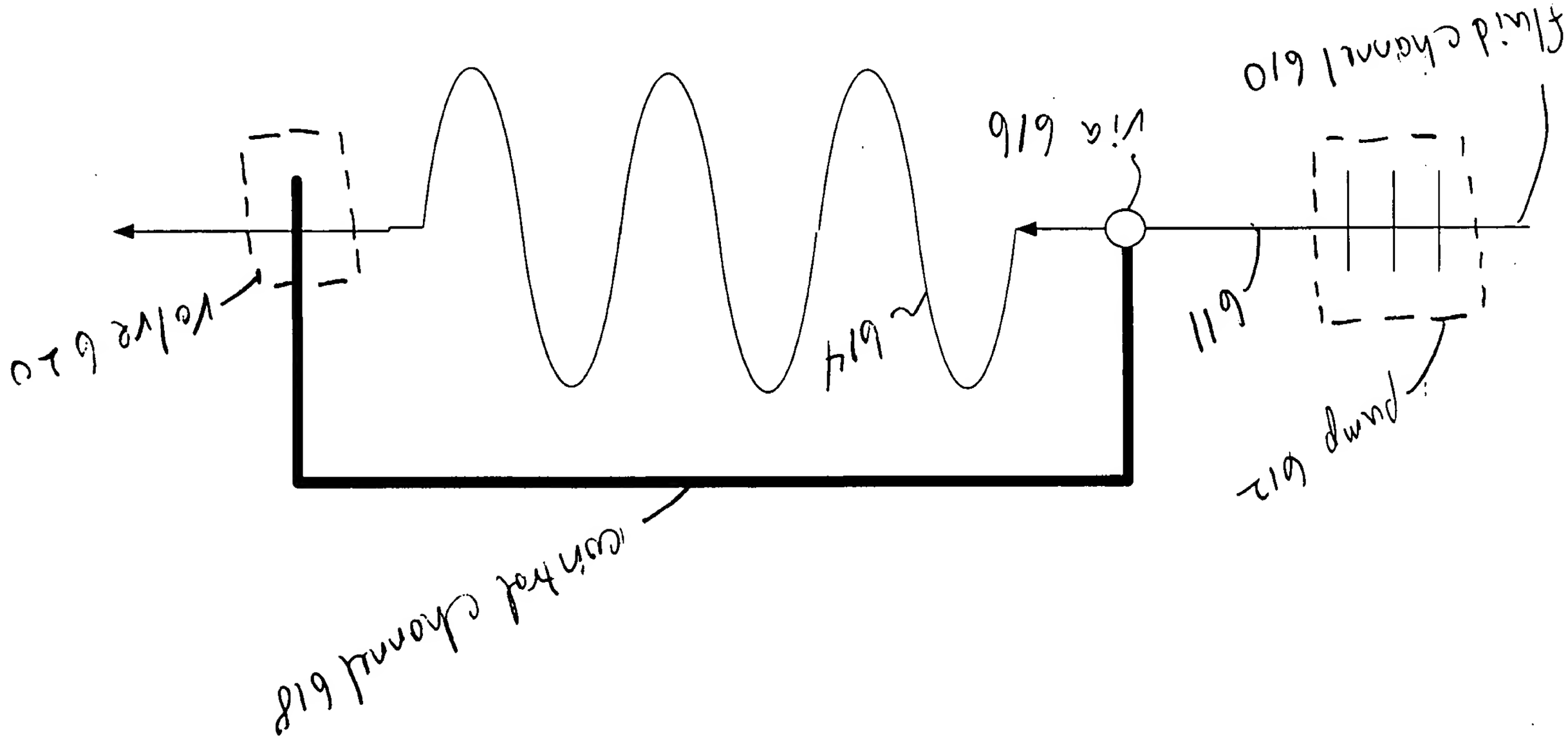


Fig 26

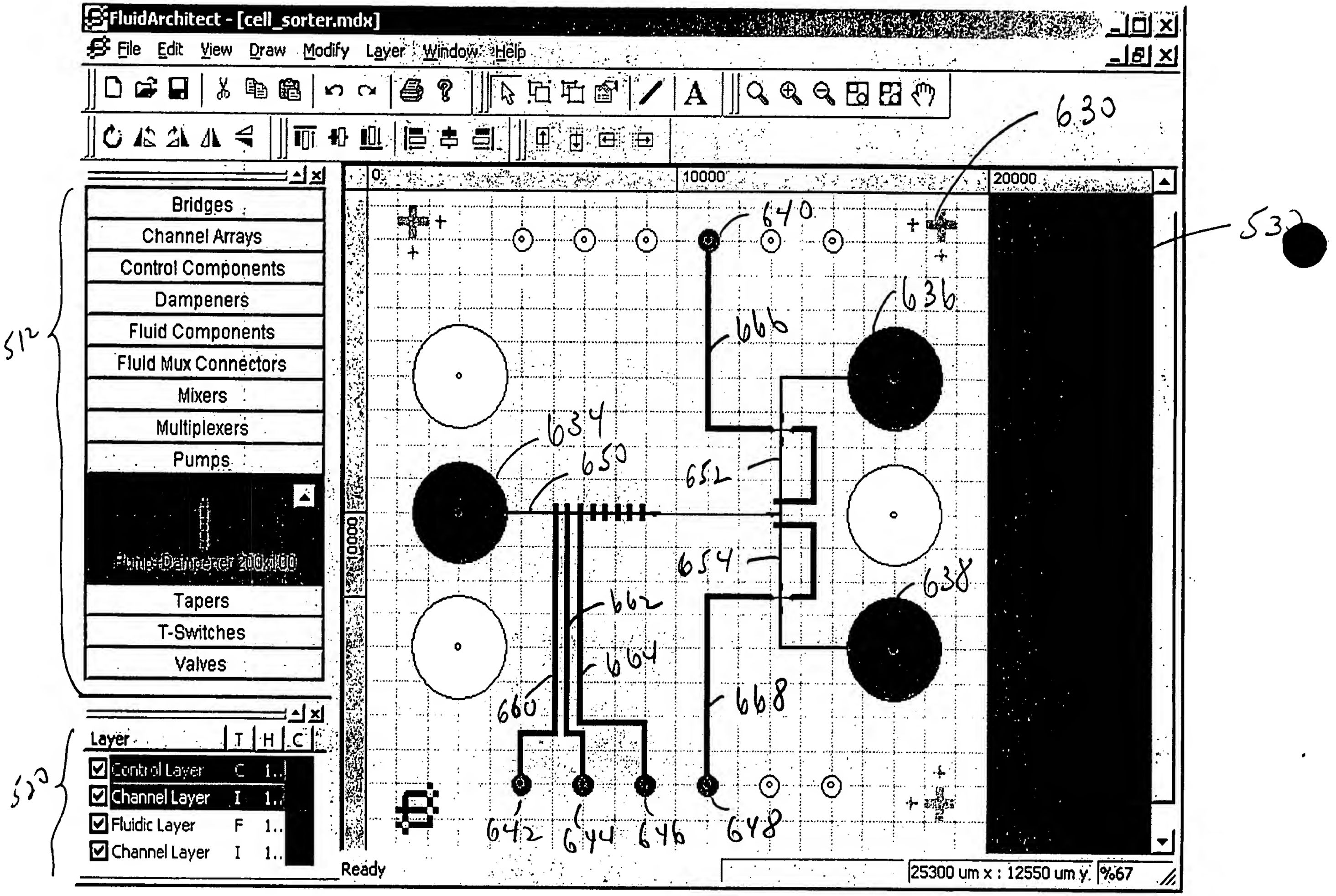

FluidArchitect - [cell_sorter.mdx]
File Edit View Draw Modify Layer Window Help
Bridges
Channel Arrays
Control Components
Dampeners
Fluid Components
Fluid Mux Connectors
Mixers
Multiplexers
Pumps
Tapers
T-Switches
Valves
Layer T H C
Control Layer C 1..
Channel Layer I 1..
Fluidic Layer F 1..
Channel Layer I 1..
Ready
0
10000
20000
25300 um x : 12550 um y.
%67
630
640
636
666
634
650
652
654
638
662
664
660
668
642
644
646
648
532
512
520

Fig 27

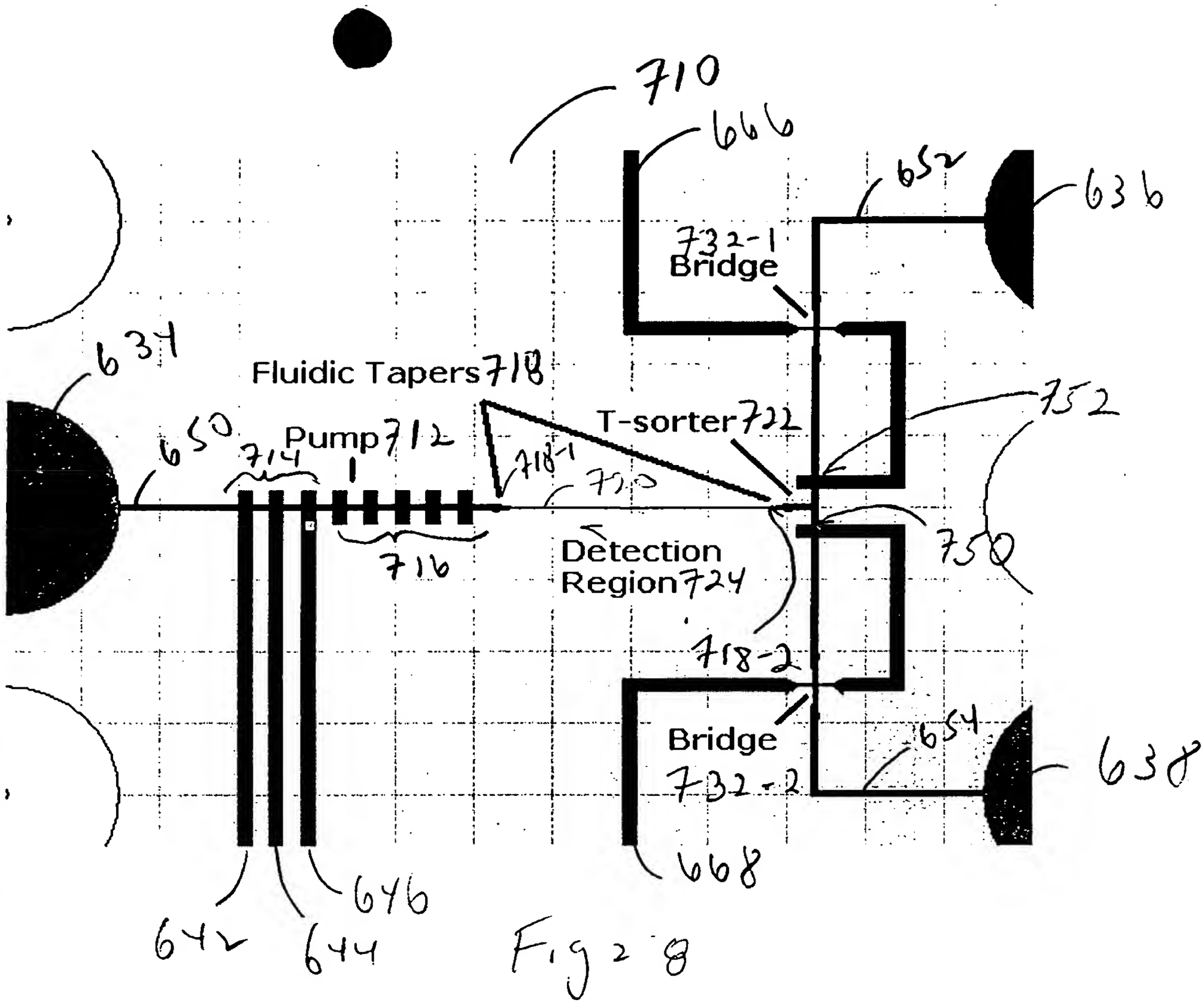

710
666
652
636
732-1
Bridge
634
Fluidic Tapers 718
650
Pump 712
714
718-1
720
T-sorter 722
752
Detection
Region 724
750
718-2
Bridge
732-2
654
638
668
642
644
646

Fig 28

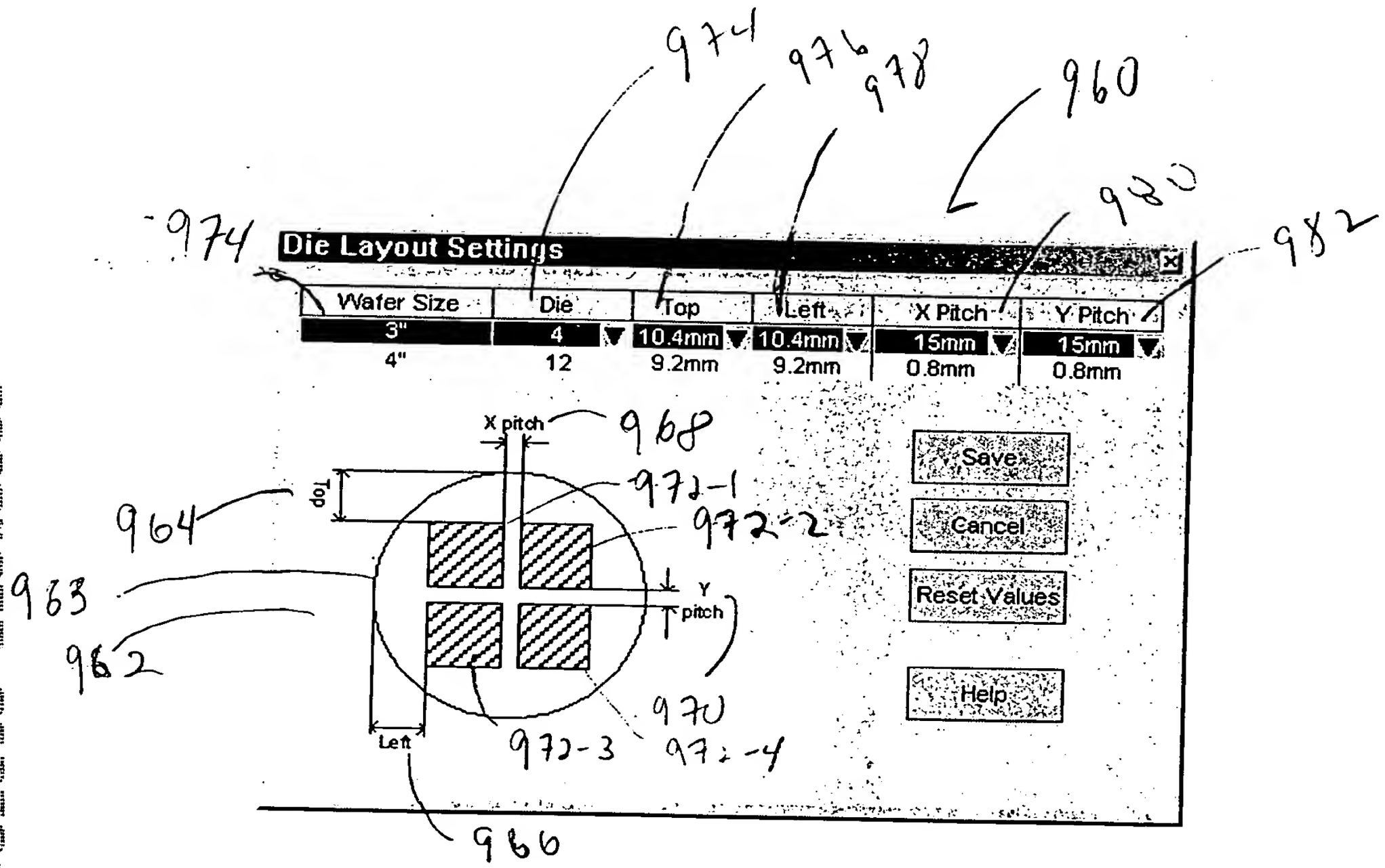

974
976
978
960
980
982
Die Layout Settings
Wafer Size
Die
Top
Left
X Pitch
Y Pitch
3"
4
10.4mm
10.4mm
15mm
15mm
4"
12
9.2mm
9.2mm
0.8mm
0.8mm
X pitch
968
Top
972-1
964
972-2
963
Y pitch
962
970
Left
972-3
972-4
966
Save
Cancel
Reset Values
Help

Fig 29.